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An Increase in Forward Buying

Consumers Would Contract More Freely

Railroad Demand Keeps Up—Round Sales of Basic Iron for Western Delivery

Summed up, the latest developments in finished steel products are these: A larger business in some of the heavier lines, a continuance of the better buying by the railroads, lower prices where there has been any change and more offers from consumers to place long-time contracts at present levels. This last is the most significant feature of the situation. There are also offers to take and pay for, as soon as the mills can ship, rolled steel in various forms sufficient to last the would-be buyers for months. While some mills are resisting the effort to carry present prices far into next year, there is evidently an increase in forward selling. The whole price situation turns on the amount of backlog accumulated under this movement.

Attention is still focused on the railroads. Car buying last week made a larger week's total than in months and other good-sized orders are yet to be given out. The New York Central added 5350 to its previous total, and the B. & O. gave out three orders calling for 2000, 1000 and 1500 cars, respectively. In the Pittsburgh district the plate and structural tonnage resulting from car orders placed with local builders amounts to 60,000 tons and Chicago district mills have booked 40,000 tons of plates and shapes for Western car shops.

The Atlantic Coast Line has bought 12,000 tons of rails from the Carnegie Steel Company and 7000 tons from the Maryland Steel Company. The Reading and the Central of New Jersey have placed 18,000 to 20,000 tons with the Pennsylvania Steel Company and the Bethlehem Steel Company. In addition to the 21,000-ton order which went to Gary, the Burlington road has bought 40,000 tons of open-hearth rails from the Colorado mill. The New Haven is added to the list of roads figuring on next year's requirements. Arrangements may be made that will bring some 1912 rail rolling to the mills for December, filling gaps that have been giving some concern.

There is larger buying of steel bars and July 1, 1912, is, as a rule, the limit on contracts. Two sellers are reported to be holding to 1.10c., Pittsburgh, as a minimum, but it is known that on some large lots, of small range in sizes, the price has gone to 1.05c. In the Chicago district sales have been made which on a Pittsburgh basing would figure even lower.

In plates, structural shapes and bars, the products on which the mills in different districts come into sharpest competition, the week's prices have shown

Mechanical and Civil Engineers.
PITTSBURGH, PA.

variations of \$1 to \$3 a ton, when reduced to a Pittsburgh basis, the differences being largely a matter of freight rates.

In the lighter products conditions are not uniform. Sheet prices are so low that buyers are trying to place large orders, but the mills would rather travel closer to actual consumptive needs, believing that the market is scraping bottom. Tin-plate mills are down to 45 per cent. of capacity in current operations. In wire the deeper cuts in prices have not produced more business.

Eastern cast iron pipe makers have an inquiry from a gas company for nearly 15,000 tons of pipe for next year—a larger tonnage than any single interest has ever called for at this time of year for spring delivery. Low prices are stimulating demand in this industry, as in others.

Foundry pig iron buying has increased somewhat in nearly all districts. At Chicago local foundry iron at \$14 for No. 2 is crowding out Southern iron on a \$10, Birmingham, basis. Cincinnati, Buffalo and Cleveland report better buying by foundries, but the uncertainty about raw material prices for 1912 is still a factor.

In basic iron several large lots have been closed. At St. Louis over 15,000 tons was taken by Chicago district and Central Western furnaces, and more business is pending there. A northern Ohio steel plant bought 10,000 tons at a new low price for this year, reported at \$12.35 at Valley furnace. The Eastern steel works have been holding up shipments of basic iron lately and the prospects are that several more blast furnaces in that section will go out.

Iron and Steel Works Improvements

Periods of stationary or decreased demand for iron and steel products operate to decrease but not to stop the flow of capital into improvements. They do alter in a fundamental way the channels through which the capital flows and the use to which it is put. In a period of increasing demand additional capacity is to be provided, and the manufacturer thinks chiefly of how cheaply the output may be increased. The opportunity is embraced, of course, to adopt new methods and devices, but the chief desideratum is the increased output. In periods of slackened demand, by which we mean periods in which there is either an absolute decrease in the demand or such a decline in the relative rate of increase as brings about a condition of surplus capacity, the flow of capital continues, though perhaps in smaller volume; but the capital is used chiefly to reduce cost of manufacture, the necessity for which is particularly pressing at such times.

From a period of slackened demand the iron trade always emerges with its average costs reduced and with the general standard elevated. This improvement in the average is brought about partly by the investment of new capital and partly by the elimination of unfit plant, which has been below the average and the withdrawal of which serves to improve the general average by leaving the field exclusively to the more fit.

The blast furnace is by far the oldest of our iron and steel manufacturing institutions, the Bessemer and open-hearth steel processes, with their attendant equipment and the rolling facilities adapted to them, being comparatively new. The history of the blast furnace industry is one of wholesale elimination in every period of depression. The period of depression

in the nineties marked as unfit dozens and dozens of blast furnaces. Mr. Swank's compilation in the 1892 directory showed a total of 14,550,708 gross tons of blast furnace capacity for January, 1892. The best production in a half year was the 4,911,763 tons in the preceding six months, at the rate of 9,823,000 tons a year, and three years intervened before that half-year record was broken. From January, 1892, to January, 1899, blast furnace erection did not cease. Many new furnaces were built and many others were improved so as to have much larger annual output, yet the boom of 1899, with the very high prices attendant, found the blast furnace industry unable to produce more than 13,620,703 tons, which was almost a million tons less than the claimed capacity of seven years earlier. There is no question that a great many furnaces, assumed in January, 1892, to be fit were shown by the hard times of 1893-8 to be wholly out of the running. In the intervening years they were either actually dismantled or marked as impossible, so that they were not a factor in 1899. The average standard of blast furnace operation was raised by the elimination of these unfit furnaces.

Outside of the raising of the general standard by the elimination of the unfit there has been the factor of actual improvement in methods and devices during periods of relative depression. Some of the most important developments of the past quarter century occurred during the depression of the nineties, the pioneer work or the extensive adoption occurring in that period. The Duquesne blast furnaces, for instance, were blown in, two in 1895 and two in 1897, and marked a distinctly new type, with much greater blowing capacity than had theretofore been provided, while in the handling of material they also constituted a distinct step forward.

The basic open-hearth steel process as a tonnage proposition in the United States had its birth in the depression referred to, and the conditions which favored its adoption were distinctly those of hard times. Three factors dictated its adoption: Very cheap scrap, which had previously been absorbed on fair terms by the iron mills; very cheap pig iron from furnaces in Alabama, where the development had been overdone, and very low transportation rates from Birmingham to Pittsburgh because the railroads stood badly in need of business.

The modern continuous merchant bar mill was distinctly the child of the 1893-8 depression. It gave wonderful promise of economy in manufacture, and without such promise it would not have been adopted at the time. The first steel interests which installed it fully recognized the lessened manufacturing cost assured, and adopted it although they had no assurance that they could find tonnage for full operation. Indeed, it was stated frankly on behalf of the first two installations that the mills would save their owners money even if only enough orders could be found to operate them at an average of one-half capacity.

A large part of the pioneer work and the epoch-making expansion in capacity in the tin plate industry occurred in the depression. Those who urged the imposition of a protective duty in the McKinley law of 1890 claimed that a rate of 2.5 cents per pound was needed, and no serious claim was ever made that tin plate manufacture was a possibility in the United States under the previous duty of 1 cent a pound. The 2.2-cent duty which was actually incorporated in the McKinley law was regarded as not more than sufficient, yet times had so changed, as to the cost of steel in

the open market and as to the manufacture of tin plate itself, that when the Wilson-Gorman law of 1894 reduced the duty to 1.2 cents the industry continued to grow, and indeed grew faster than before, not because the duty was reduced, but because conditions made the reduced duty sufficient.

In the expansion in iron and steel demand since 1898 an enormous amount of capital has been invested in iron and steel making, and much of it has been spent upon new methods and apparatus; but in the spending of by far the major part of this capital increase in capacity was the chief aim, the adoption of new processes and equipment being simply incidental. New plant was being built, and naturally the most modern ideas were adopted. Of construction for the purpose of replacing old plant with newer and more modern there has been considerable, but this has constituted a relatively small proportion of the total outlay.

The prospect is that the next half dozen years will see a change in the direction of the flow of capital, whereby the major portion will be expended for the purpose of reducing cost of manufacture rather than for the purpose of increasing output. There are many promising fields, and as producers are having a respite from the task of striving for larger outputs per unit of equipment in order to keep pace with the activities of sales departments, there will be ample time for thorough study. From the by-product coke oven and thin-wall blast furnace clear through to the steam exhaust of the rolling mill, where a turbine may be attached, there are opportunities for study and the adoption of ideas which such study may approve. Whatever may be the steel prices and wage rates of five years hence, there is no question that measuring the quality of finished steel produced in terms of mental and manual labor expended, the average cost of production will be very materially reduced.

The Trust Prosecutions

The stock market last week took on the appearance of a jubilation after the announcement of the United States Circuit Court's decision regarding the disintegration of the American Tobacco Company. The decision was much more favorable to those holding the securities of the company than had been expected. The properties of the company were not divided among a large number of small interests, but were separated into four leading parts. Under this arrangement the interests of the stockholders and of the various classes of bondholders appear to have been amply protected.

The announcement of such a result of the proceedings by the Department of Justice against this great corporation was immediately taken as a message of reassurance to other great corporations which are either the subject of government prosecution or are likely to be. The assumption was drawn that the courts are inclined to be tender in handling the great interests coming under their care and not to enforce the drastic division of the property of such corporations into either their original components or into very small units incapable of wielding an important part in their respective branches of trade. It was taken as proof that the United States courts will be conservative in handling matters of this kind. The fear had prevailed that the ferocity of certain of the government prosecutors would be imparted to some extent to the judges and that a decision would be rendered that

would work considerable financial loss to the holders of the company's securities.

While the stock market has acted as though the skies had cleared for great corporations, and that hereafter no serious harm is to be expected to them, a sober contemplation of the situation hardly seems to warrant extravagance of delight at what has so far occurred. The decision is not necessarily final, but can be appealed to the Supreme Court, and the views of the Department of Justice may there be received with more consideration. Nor will the result in the case of this particular company measure what may be meted out to a company in a different branch of trade, as it seems necessary from the position taken by the courts that each case shall be considered on its own merits.

Beyond this, however, comes the even more serious consideration that leaders of public opinion and of political action in Congress may now be spurred to greater activity in endeavoring to curb the power of corporations. Indications are not wanting that measures of this character are likely to be brought forward by leaders of radical legislation. On the other hand, equally strong indications appear that a great part of the public, probably more than ever before, is tired of the baiting of corporations, and that an effort will be made, not only to shelve any further proceedings in that direction, but probably to amend the Sherman act so as to make it less injurious to business interests. It may be possible that in this great conflict of public opinion and of political turmoil the climax of interference with large business may be reached, toward which the business world has long been looking.

Commercialized Engineering

To say that engineering is becoming commercialized may arouse a combative spirit in the engineer. It is not intended to intimate that engineering is necessarily being subjected to opprobrium, nor to announce a discovery of a present tendency. Engineering is rapidly being recognized as a profession, notwithstanding a not infrequent claim that fees for engineering service are far below comparison with fees for other professional service. Signs have been apparent, however, to those stopping long enough to consider that untrammelled expression to the initiative, originality and resourcefulness of the engineer is not always allowed. This statement takes the term engineering in its broad sense, variously defined by authorities, in which the intimate relation is maintained between, say, the scientific and the financial.

It may be well to particularize. The engineer develops an article which is meritorious from the economy or comfort which it will contribute to mankind. It is calculated to replace an article which is itself satisfactorily filling a mission, in the light of common knowledge. The investment in the article of current use is large; the demand has not yet been fully met; so long as it remains profitable to maintain and supply the market the newer device remains hidden from general knowledge. Finally at the propitious moment from the commercial standpoint the invention, design or discovery of the new article is heralded; a demand for it is created, and the older article, even if recently purchased, becomes obsolete over night. It is a question if mankind has not lost a little to the advantage of those in control of the two articles.

Justification for the procedure may be claimed on the same basis as that on which the development of standards rests. If carried to the limit it would mean ultimately little or slow progress. The difficulty of securing an engineering structure of any sort along lines meeting strictly in the best manner the special problem involved is serious in considering, for example, international commerce. Great freedom seems to be given to the Continental engineer. Yet it may be that the situation abroad is as unsatisfactory in this respect as it is in the other respect in this country. Certainly in some lines of engineering one finds as much difference in Europe among what might well be substantially identical plants as there once was among equal priced watches of Swiss manufacture. It is of great economic importance to have interchangeability, but universal application should not be attempted. Definite differences meeting special engineering demands tend to encourage similar endeavor in later problems. It would seem that engineering in this country is very much subservient to business. It is a question, moreover, if this subordinate position is not working harm.

Inspecting Fire Equipment

As an annual reminder to the manufacturer, few are more important than the word of caution against neglect of fire protection at the beginning of cold weather. The number of fires, including those of the conflagration class, is most numerous when artificial heat has become necessary and when men are housed in works during their idle minutes, especially at noon. Every plant has more or less of a system with which to fight fires in their incipency, but during the warm months neglect is apt to creep in, until emergency apparatus has become to some extent inefficient. A detailed inspection in the autumn will reduce the danger, and the placing of responsibility for a continuance of efficiency may bring large results as a preventive.

Correspondence

Titanium Alloys With and Without Aluminum

To the Editor: I have read with great interest the long letter written by Mr. Hulbert, of the Goldschmidt Thermit Company on the subject of "Ferrotitanium and Its Use." This letter is published in your issue of October 12, and is in reply to one of mine on the same subject published July 27.

The question of the condition of the carbon in the so-called 10 per cent and 15 per cent alloys, made by the Titanium Alloys Mfg. Company was considered rather fully in my previous letter and need not be dwelt upon now. Mr. Hulbert's statement that all ferroalloys should be free from carbon is altogether too sweeping. Since the time of Mushet steelmakers have used spiegel-eisen and ferromanganese in increasingly large amounts when making both crucible and the large tonnage steels, with splendid results. By the latter I mean Bessemer and open hearth steels. All the manganese alloys classed under the heads of spiegel-eisen and ferromanganese contain a large percentage of carbon, the presence of which is a disadvantage only in very rare cases, such as the making of low carbon steels for experimental purposes or for special uses.

One of the special advantages of the 10 per cent and 15 per cent ferrotitanium alloys is that they are so cheap, and so little is needed to bring about good results, that they are not restricted to special steels made only in small quantities, but are also applicable to the large tonnage steels. It is a matter of great interest to all those who

were fortunate enough to be engaged in the pioneer experimental work with these alloys, to see them being used more and more extensively in this latter field. Ferrochromium is another ferroalloy that is largely used with excellent results, and it contains considerable carbon. There is no question of the fact that a good deal of the manganese and chromium in the ferroalloys mentioned is combined with carbon in the form of double carbides, but this does not prevent the metal bath taking up the full amount of chromium or manganese added, less the part oxidized.

SOLUBILITY AND MELTING POINT.

With regard to the subjects of solubility and melting point, Mr. Hulbert is quite right in saying that they are two entirely different things. His, or rather Dr. Goldschmidt's, illustrations from the domain of nonferrous metallurgy are not, however, directly applicable to the question of the solubility of ferrotitanium in a bath of molten steel. In the latter case there is no question in my mind that a comparatively low melting point will greatly assist solubility. The proper place to test theories regarding steel making is in the steel mill and the various laboratories. After several years' experience with the 10 per cent and 15 per cent titanium alloys, covering the making of thousands of tons of steel, I can say that when added properly they are readily taken up by both acid Bessemer and basic open hearth steel, at ordinary casting temperatures.

LADLE ADDITIONS NOT BEST.

I must take exception to the dogmatic character of another of Mr. Hulbert's statements, namely, that the best way to use any deoxidizing ferroalloy is in the ladle or runner. The greatest deoxidizing ferroalloys in use today, with regard to the work done and the amount used, are those of manganese and silicon. In acid Bessemer practice, when making rail steel, experience at more than one mill has shown that much better results are obtained when the spiegel mixture is added to the converter and not to the ladle. This spiegel mixture contains large amounts of both manganese and silicon. The reasons for this practice are very interesting, but will not be gone into now. Also in open hearth practice the best results, with regard to the quality of the steel, are obtained when the whole or part of the manganese and silicon alloys necessary are added in the furnace.

ALUMINUM IN THE TITANIUM ALLOY.

Mr. Hulbert's next argument is with regard to the aluminum in the Goldschmidt titanium alloy, which is unavoidably present in considerable amount. His contention is that this aluminum is beneficial for several reasons which he quotes from a recent letter by Dr. Goldschmidt. The main point is that after solution of the alloy in a molten bath of steel the titanium is changed to TiO_2 , which oxide separates from the steel only with difficulty. If, however, aluminum is present with the titanium then Al_2O_3 is also produced which unites with the TiO_2 forming titanate of aluminum, more easily fusible than TiO_2 . In other words, the mental picture produced is that the TiO_2 has to separate from the steel as TiO_2 , unless aluminum is also present in the alloy, when the Al_2O_3 produced helps it by forming titanate of aluminum. Other paragraphs, however, say that aluminum is a much stronger deoxidizing agent than titanium, and that when this alloy is used the aluminum first reduces all the oxides and impurities present. This, therefore, will remove the oxides and it will be impossible for any TiO_2 to form.

Some of the chemical physics involved when ferrotitanium is added to a bath of molten steel are unknown, and concerning them only theories can be made. One thing, however, is definitely known, and has been proved through several years' experience. It is that the use of titanium alloys containing no aluminum gives steels that are remarkably clean, solid, and free from slag-like materials. This is so noticeable that it constitutes one of the chief advantages of using ferrotitanium.

The explanation is probably as follows: The oxygen present in the bath of steel exists, not as oxygen, but as various oxides. Of these the most harmful is ferrous oxide, FeO existing in solution in the metal. At the same time considerable amounts of silica, SiO_2 , and oxide of manganese, MnO , are undoubtedly present as the addition of ferrotitanium generally closely follows that of the manganese and silicon alloys used. Smaller or larger

amounts of intermingled slag are also probably present. The titanium of the ferrotitanium decomposes the FeO , setting free iron and forming TiO_2 , which does further very useful work by uniting with the other oxides and impurities, giving a fluid slag that separates readily from the metal. The great value of the TiO_2 in helping to produce such a slag is recognized, and its importance has been pointed out by such well known metallurgists as Professors Howe and Stoughton. If Al_2O_3 is present, or is formed intentionally, there is then so much the more harmful material for the TiO_2 to help to slag off.

In other words, the Al_2O_3 will prevent a large amount of the TiO_2 from uniting with, and helping to remove as slag, the oxides and impurities already present in the liquid steel.

G. B. WATERHOUSE.

BUFFALO, N. Y., November 6, 1911.

The Tobacco Trust Decision

The United States Circuit Court, New York, handed down opinions November 8, approving the plan of the American Tobacco Company for its division into 4 companies. Some conditions suggested by Attorney-General Wickersham were adopted, but these do not materially change the plan suggested by the company. His request that the new companies be kept under the jurisdiction of the court for five years, so that a try-out of the plan may be made with a reservation of the government privilege of re-opening the subject in case competition is not restored, is denied. The question of a possible appeal to the Supreme Court will rest with the Attorney-General, as the government is the only party to the suit aside from the defendants, who are not expected to object to the minor changes specified by the court. The independent tobacco interests were not able to impress their views on the court sufficiently to secure the more complete disintegration of the company.

Judge Lacombe, who wrote the principal opinion, holds broadly that the court would have no power to order the substitution of a different plan for that submitted and that even the changes which are approved can be made only with the consent of the defendants. He says:

It would be sheer waste of time, therefore, to consider any plan radically different from the one now before us; if we find this plan would not create the condition defined in the opinion of the Supreme Court, or if such modifications as we may require as a condition of giving our approval are not accepted by defendants, we must obey the mandate of that court; must seize the property and sell it at public auction in appropriate and convenient lots, applying the proceeds of the sale to the payment of the debts (including the mortgages) or of such dividend thereon as the proceeds may allow, turning over the surplus, if any, to the owners of the equity.

The contention that no dissolution plan would be effective and that a receiver should be appointed is dismissed with the remark that "evidently the Supreme Court believed some plan was practicable or it would not have directed this court to inquire into the matter." Other plans of dissolution, differing widely in form and scope, are dismissed because "there is no suggestion that the defendants will adopt them," Judge Lacombe arguing that the plan of the defendant must either be approved or rejected, and not changed in character.

Judge Lacombe stands on the decisions of the Supreme Court in the Northern Securities and Standard Oil cases, wherein the same situation was created as to whether the present owners would continue to be the owners of the new companies. He says that since this method of disintegration was acquiesced in by the Supreme Court it would seem that the question has been settled for the Circuit Court by the controlling authority.

Judge Noyes, in his opinion, says that "the successful reconstruction of this organization should teach that the effect of enforcing the statute against industrial combinations is not to destroy but to reconstruct; not to demolish but to re-create in accordance with the conditions which Congress has declared shall exist among the people of the United States."

Judge Cox, in his opinion, says he approves the plan not because he thinks it perfect, but because it is the best obtainable. He says: "The plan which we have sanctioned eliminates the objectionable features and permits no unreasonable or unlawful restraint of trade."

The court has laid some prohibitions upon the new companies to be formed and upon the interests affected by the decree. The companies shall have no officers or directors in common; they shall not hold each other's stocks; they shall not have the same purchasing and selling agents or officers. Also, they are enjoined from the doing of the things enumerated in the court's opinion as being in violation of the law.

The Stanley Investigating Committee

WASHINGTON, D. C., November 13, 1911.—The Stanley Investigating Committee will resume its hearings on Monday, November 20. These hearings, like those of the last session, will be held by the full committee, which consists, in addition to the chairman, of Representatives Beall, of Texas; Bartlett, of Georgia; Littleton, of New York; McGillicuddy, of Maine; Young, of Michigan; Danforth, of New York; Gardner, of Massachusetts, and Sterling, of Illinois.

No definite programme has been arranged by the chairman, nor is one likely to be. The investigation will probably begin with a thorough inquiry into the transportation question and all the related subjects, which will include also those of the Minnesota ore fields and their operations. With these exceptions the hearings will be governed largely by the developments from day to day. Before adjournment the entire field of inquiry will be fully covered and the widest latitude consistent with a proper regard for time will be permitted both the individual members of the committee and those appearing before it.

Mr. Stanley finds from his correspondence and other sources that interest in the hearings is quite as keen as it was when recess was taken a few months ago. This is no less true of the general public than it is of his committee associates, all of whom have announced their intention to be present at the opening day, and this includes one member who it was thought until a few days ago would be unable, by reason of illness, to reach Washington until the regular Congressional session had begun.

It is not Mr. Stanley's intention to subpoena witnesses but to invite certain gentlemen to appear and give the committee the benefit of their views. He does not doubt that in every case those who are so invited will promptly accept. It is not unlikely that Andrew Carnegie and J. P. Morgan will be among the gentlemen of distinction in the financial and industrial world who will appear before the committee. The hearings are expected to last a month, everything depending on the volume of testimony brought out and its relative importance. That the hearings will be quite as interesting from a popular standpoint as were those of last session is quite evident from Mr. Stanley's observation that "the best is still to come."

J. G.

The Woodward Iron Company's Purchase.—By the purchase of the Birmingham Coal & Iron Company by the Woodward Iron Company of Birmingham, Ala., the latter company acquires 37,000 acres of coal lands, with a coal mine at Mulga, Ala., 2400 acres of ore lands, two blast furnaces and a coke plant. The purchase gives the Woodward interests important coal reserves, a direction in which their mineral holdings needed reinforcement. It is reported that the Woodward Iron Company will soon contract for a duplicate of its Koppers by-product coke plant at Woodward, erected last year. The report is also revived that the company will build a steel plant, but no definite announcement of plans is made. The authorized capital stock of the Birmingham Coal & Iron Company is \$5,000,000. The bonded debt consists of \$2,159,000 first consolidated gold 5's, due in 1927, and \$2,000,000 of Birmingham Iron Company general gold 5's, due in 1926. The two Vanderbilt blast furnaces of the company are located just east of Birmingham.

The question of hours of labor in shops in San Francisco, Cal., which has been under discussion between the California Metal Trades Association and the Iron Trades Council for several weeks, has been referred to the San Francisco Industrial Conciliation Board for arbitration. Pending a decision, the eight-hour day will be continued.

The Iron and Metal Markets

A Comparison of Prices

Advances Over the Previous Week in Heavy Type,
Declines in Italics.

At date, one week, one month and one year previous.

	Nov. 15, 1911.	Nov. 8, 1911.	Oct. 18, 1911.	Nov. 16, 1910.
PIG IRON, Per Gross Ton:				
Foundry No. 2 standard, Philadelphia	\$15.00	\$15.00	\$15.00	\$15.75
Foundry No. 2, Valley furnace.	13.25	13.25	13.50	13.75
Foundry No. 2 Southern, Cincinnati	13.25	13.25	13.25	14.25
Foundry No. 2, Birmingham, Ala.	10.00	10.00	10.00	11.00
Foundry No. 2, at furnace, Chicago	14.00	14.10	14.50	16.00
Basic, delivered, eastern Pa.	14.50	14.50	14.50	14.75
Basic, Valley furnace.	12.35	12.50	12.50	13.25
Bessemer, Pittsburgh.	14.90	15.15	15.40	15.90
Gray forge, Pittsburgh.	13.40	13.40	13.65	14.15
Lake Superior charcoal, Chicago	16.50	16.50	16.50	18.00
COKE, CONNELLSVILLE,				
Per Net Ton, at Oven:				
Furnace coke, prompt shipment.	1.55	1.50	1.50	1.50
Furnace coke, future delivery.	1.65	1.55	1.55	1.75
Foundry coke, prompt shipment.	1.90	1.80	1.80	2.00
Foundry coke, future delivery.	2.10	2.00	2.00	2.25
BILLETS, &c., Per Gross Ton:				
Bessemer billets, Pittsburgh.	19.50	20.00	20.00	23.50
Open hearth billets, Pittsburgh.	19.00	19.00	19.00	23.50
Forging billets, Pittsburgh.	24.00	24.00	24.00	28.50
Open hearth billets, Philadelphia.	21.40	22.40	21.40	25.50
Wire rods, Pittsburgh.	25.00	25.50	26.00	28.00
OLD MATERIAL, Per Gross Ton:				
Iron rails, Chicago.	14.50	14.50	13.50	16.00
Iron rails, Philadelphia.	15.50	15.50	16.50	18.00
Car wheels, Chicago.	12.00	12.00	12.50	13.50
Car wheels, Philadelphia.	11.25	11.25	11.75	13.75
Heavy steel scrap, Pittsburgh.	12.00	12.00	12.00	14.25
Heavy steel scrap, Chicago.	9.50	9.50	9.75	12.25
Heavy steel scrap, Philadelphia.	11.50	11.50	12.00	13.50

FINISHED IRON AND STEEL,				
Per Pound to Largest Buyers:				
Bessemer rails, heavy, at mill.	1.25	1.25	1.25	1.25
Iron bars, Philadelphia.	1.20	1.20	1.22	1.37
Iron bars, Pittsburgh.	1.20	1.20	1.20	1.45
Iron bars, Chicago.	1.15	1.15	1.17½	1.35
Steel bars, Pittsburgh.	1.10	1.10	1.10	1.40
Steel bars, tidewater, New York	1.26	1.26	1.26	1.56
Tank plates, Pittsburgh.	1.15	1.15	1.15	1.40
Tank plates, tidewater, New York	1.31	1.31	1.31	1.56
Beams, Pittsburgh.	1.15	1.15	1.20	1.40
Beams, tidewater, New York.	1.31	1.31	1.36	1.56
Angles, Pittsburgh.	1.15	1.15	1.20	1.40
Angles, tidewater, New York.	1.31	1.31	1.36	1.56
Skelp, grooved steel, Pittsburgh.	1.22½	1.15	1.15	1.25
Skelp, sheared steel, Pittsburgh.	1.20	1.25	1.25	1.35

SHEETS, NAILS AND WIRE,				
Per Pound to Largest Buyers:				
Sheets, black, No. 28, Pittsburgh	1.85	1.85	1.85	2.20
Wire nails, Pittsburgh.	1.55	1.55	1.65	1.70
Cut nails, Pittsburgh.	1.50	1.50	1.50	1.60
Barb wire, galv., Pittsburgh.	1.85	1.85	1.95	2.00

METALS,				
Per Pound:				
Lake copper, New York.	12.75	12.50	12.50	13.00
Electrolytic copper, New York.	12.62½	12.37½	12.25	12.87½
Spelter, St. Louis.	6.45	6.20	6.10	5.80
Spelter, New York.	6.69	6.35	6.30	5.95
Lead, St. Louis.	4.15	4.15	4.15	4.30
Lead, New York.	4.25	4.25	4.25	4.40
Tin, New York.	43.15	42.00	41.45	36.50
Antimony, Hallett, New York.	7.65	7.70	7.70	7.75
Tin plate, 100-lb. box, New York	\$3.64	\$3.64	\$3.64	\$3.84

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Prices of Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11c.; Cleveland, 10c.; Cincinnati, 15c.; Indianapolis, 17c.; Chicago, 18c.; St. Paul, 32c.; St. Louis, 22½c.; New Orleans, 30c.; Birmingham, Ala., 45c. Pacific coast, 80c. on plates, structural shapes and sheets No. 11 and heavier; 85c. on sheets Nos. 12 to 16; 95c. on sheets No. 16 and lighter; 65c. on wrought pipe and boiler tubes.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.15c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers, with extras:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated February 6, 1903,

or equivalent, ¼ in. thick and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per square foot, are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge, or not less than 11 lb. per square foot, to take base price. Plates over 72 in. wide ordered less than 11 lb. per square foot down to the weight of 3-16-in. take the price of 3-16-in.

Allowable overweight, whether plates are ordered to gauge or weight, to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras.		Cents per lb.
Gauges under ¼ in. to and including 3-16 in. on thinnest edge.		.10
Gauges under 3-16 in. to and including No. 8.		.15
Gauges under No. 8 to and including No. 9.		.25
Gauges under No. 9 to and including No. 10.		.30
Gauges under No. 10 to and including No. 12.		.40
Sketches (including all straight taper plates) 3 ft. and over in length.		.10
Complete circles, 3 ft. in diameter and over.		.20
Boiler and flange steel.		.10
"A. B. M. A." and ordinary firebox steel.		.20
Still bottom steel.		.40
Marine steel.		.40
Locomotive firebox steel.		.50
Widths over 100 in. up to 110 in., inclusive.		.05
Widths over 110 in. up to 115 in., inclusive.		.10
Widths over 115 in. up to 120 in., inclusive.		.15
Widths over 120 in. up to 125 in., inclusive.		.25
Widths over 125 in. up to 130 in., inclusive.		.50
Widths over 130 in.		1.00
Cutting to lengths or diameters under 3 ft. to 2 ft., inclusive.		.25
Cutting to lengths or diameters under 2 ft. to 1 ft., inclusive.		.50
Cutting to lengths or diameters under 1 ft.		1.55
No charge for cutting rectangular plates to lengths 3 ft. and over.		

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in. and angles, 3 to 6 in. on one or both legs, ¼ in. and over, 1.15c. to 1.20c. Other shapes and sizes are quoted as follows:

I-beams over 15 in.		Cents per lb.
I-beams over 18 in.		1.20 to 1.25
H-beams over 18 in.		1.30 to 1.35
Angles over 6 in.		1.20 to 1.25
Angles, 3 in. on one or both legs, less than ¼ in. thick, plus full extras as per steel bar card Sept. 1, 1909.		1.20 to 1.25
Tees, 3 in. and up.		1.20 to 1.25
Tees, 3 in. and up.		1.15 to 1.20
Angles, channels and tees, under 3 in., plus full extras as per steel bar card Sept. 1, 1909.		1.20 to 1.25
Deck beams and bulb angles.		1.45 to 1.50
Hand rail tees.		2.00 to 2.15
Checkered and corrugated plates.		2.00 to 2.15

Sheets.—Makers' prices for mill shipments on sheets of U. S. standard gauge, in carload and larger lots, on which jobbers charge the usual discounts for small lots from store, are as follows:

Blue Annealed Sheets.		Cents per lb.
Nos. 3 to 8.		1.25 to 1.30
Nos. 9 and 10.		1.35 to 1.40
Nos. 11 and 12.		1.40 to 1.45
Nos. 13 and 14.		1.45 to 1.50
Nos. 15 and 16.		1.55 to 1.60
Box Annealed Sheets, Cold Rolled.		
One Pass.		
Nos. 10 to 12.		1.50 to 1.55
Nos. 13 and 14.		1.55 to 1.60
Nos. 15 and 16.		1.60 to 1.65
Nos. 17 to 21.		1.65 to 1.70
Nos. 22, 23 and 24.		1.70 to 1.75
Nos. 25 and 26.		1.75 to 1.80
No. 27.		1.80 to 1.85
No. 28.		1.85 to 1.90
No. 29.		1.90 to 1.95
No. 30.		2.00 to 2.05
Three Pass.		
Nos. 10 to 12.		1.85 to 1.90
Nos. 13 and 14.		1.95 to 2.00
Nos. 15, 16 and 17.		2.10 to 2.15
Nos. 18 to 22.		2.25 to 2.30
Nos. 23 and 24.		2.35 to 2.40
Nos. 25 and 26.		2.55 to 2.60
No. 27.		2.70 to 2.75
No. 28.		2.85 to 2.90
No. 29.		2.95 to 3.00
No. 30.		3.15 to 3.20

Galvanized Sheets, of Black Sheet Gauge.		
Nos. 10 and 11.		1.85 to 1.90
Nos. 12, 13 and 14.		1.95 to 2.00
Nos. 15, 16 and 17.		2.10 to 2.15
Nos. 18 to 22.		2.25 to 2.30
Nos. 23 and 24.		2.35 to 2.40
Nos. 25 and 26.		2.55 to 2.60
No. 27.		2.70 to 2.75
No. 28.		2.85 to 2.90
No. 29.		2.95 to 3.00
No. 30.		3.15 to 3.20

All above rates on sheets are f.o.b. Pittsburgh, terms 30 days net, or 2 per cent. cash discount in 10 days from date of invoice, as also are the following base prices per square for painted and galvanized roofing sheets, with 2½-in. corrugations.

Corrugated Roofing Sheets, Per Square.			
Gauge.	Painted.	Galvanized.	Gauge.
29.		\$2.30	23.
28.	\$1.30	2.45	22.
27.	1.45	2.50	21.
26.	1.55	2.60	20.
25.	1.80	3.00	18.
24.	2.05	3.10	16.
			Painted.
			\$2.35
			2.55
			2.75
			3.00
			4.00
			5.65
			6.45

Wire Rods and Wire.—Bessemer, open hearth and chain rods, \$25 to \$25.50. Fence wire, Nos. 9 to 16, per 100 lb., terms 60 days, or 2 per cent. discount in 10 days, carload lots, to jobbers, annealed, \$1.35; galvanized, \$1.65. Carload lots, to retailers, annealed, \$1.45; galvanized, \$1.75. Galvanized bar wire to jobbers, \$1.85; painted, \$1.55. Wire nails, to jobbers, \$1.55.

The following table gives the price to retail merchants on wire in less than carloads, including the extras on Nos. 10 to 16, which are added to the base price:

Fence Wire, Per 100 lb.								
Nos.	0 to 9	10	11	12 & 12½	13	14	15	16
Annealed	\$1.55	\$1.60	\$1.65	\$1.70	\$1.80	\$1.90	\$2.00	\$2.10
Galvanized	1.85	1.90	1.95	2.00	2.10	2.20	2.60	2.70

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card on wrought pipe, in effect from October 2, 1911:

Butt Weld.			
		Steel	Iron
		Black.	Galv.
¾ and 1 in.	73	53	68
1 in.	74	64	69
1½ in.	77	67	72
2 in.	80	72	75
2 in. to 3 in.	81	74	76
Lap Weld.			
1½ and 1½ in.	..	68	61
2 in.	77	70	72
2½ to 4 in.	79	72	74
4½ to 6 in.	78	70	73
7 to 12 in.	76	66	71
13 to 15 in.	52	..	47
Butt Weld, extra strong, plain ends, card weight.			
¾, 1, 1½ in.	70	60	65
2 in.	75	69	70
2½ to 1½ in.	79	73	74
2 to 3 in.	80	74	75
Lap Weld, extra strong, plain ends, card weight.			
1½ in.	..	66	60
2 in.	76	70	71
2½ to 4 in.	78	72	73
4½ to 6 in.	77	71	72
7 to 8 in.	70	60	65
9 to 12 in.	65	55	60
Butt Weld, double extra strong, plain ends, card weight.			
1½ in.	65	59	60
2 to 1½ in.	68	62	63
2 to 3 in.	70	64	65
Lap Weld, double extra strong, plain ends, card weight.			
2 in.	66	60	61
2½ to 4 in.	68	62	63
4½ to 6 in.	67	61	62
7 to 8 in.	60	50	55

Plugged and Reamed.

1 to 1½, 2 to 3 in. Butt Weld	{ will be sold at two (2) points lower basing (higher price) than merchants' or card weight pipe. Butt or lap weld, as specified.
2, 2½ to 4 in. Lap Weld	

The above discounts are for "card weight," subject to the usual variation of 5 per cent. Prices for less than carloads are three (3) points lower basing (higher price) than the above discounts.

Boiler Tubes.—Discounts on lap welded steel and charcoal iron boiler tubes to jobbers in carloads are as follows:

Steel.	Charcoal Iron.
1¼ to 2¼ in.	65
2½ in.	67½
2¾ to 3¼ in.	72½
3½ to 4 in.	75
5 to 6 in.	67½
7 to 13 in.	65

2½ in. and smaller, over 18 ft., 10 per cent. net extra.

2¾ in. and larger, over 22 ft., 10 per cent. net extra.

Less than carloads will be sold at the delivered discounts for carloads, lowered by two points for lengths 22 ft. and under to destinations east of the Mississippi River; lengths over 22 ft. and all shipments going west of the Mississippi River must be sold f.o.b. mill at Pittsburgh basing discount, lowered by two points.

Pittsburgh

PITTSBURGH, PA., November 15, 1911.—(By Telephone.)

Pig Iron.—The American Steel Foundries, which recently bought a large tonnage of basic iron from Western furnaces for its plant at St. Louis, has also bought within the past week 10,000 tons or more from Mahoning Valley furnaces, for its Alliance Works, at a price said to be about \$12.35 at furnace, for delivery in first quarter. The Westinghouse Air Brake Company is in the market for 1000 to 2000 tons each of forge and foundry iron for first quarter. The wide spread between prices of Bessemer and basic iron is being diminished. In the past week several small sales of Bessemer have been made at \$14, Valley furnace, and one sale is recorded at \$13.75, and a further decline in prices is expected. We quote Bessemer iron at \$14; malleable Bessemer, \$12.50; basic, \$12.35; No. 2 foundry, \$13.25, and gray forge, \$12.75, all at Valley furnace, the freight rate to the Pittsburgh district being 90c. a ton. Foundry iron seems to be firmer in the Valley than in the Cleve-

land and other districts. We note a sale of 200 tons of Bessemer iron for prompt shipment at \$14, and 100 tons of No. 2 foundry at \$13.25, Valley furnace.

Steel.—Prices on Bessemer steel are weaker, billets having been sold at \$20.50 or less, and sheet bars being offered at less than \$21, Pittsburgh or Youngstown mill. New inquiries for steel are very light, but consumers are specifying in a moderate way against contracts. We quote open hearth billets at \$19; Bessemer billets, \$19.50; open hearth bars, \$20; Bessemer bars, \$20.50 to \$21, and forging billets, \$24, all at mill, Pittsburgh or Youngstown district.

Ferromanganese.—Reports are that an important Ohio consumer has closed for about 600 tons of foreign 80 per cent. ferromanganese for next year's delivery at slightly under \$38, Baltimore.

(By Mail.)

As far as volume of new business in concerned, the condition of the iron trade is fairly satisfactory, but in the matter of prices there is a good deal of complaint, with no indications of betterment in the near future. The encouraging feature of the week is the placing of further car orders by the New York Central (which has now bought upward of 12,000), the Baltimore & Ohio and several other roads. A large business is being placed in structural material and plates, and specifications and orders for sheets are also heavier, but tin plate continues very dull. New business in steel bars is steadily growing and two important mills have pegged their prices at 1.10c. In the wire trade, with prices \$3 or \$4 a ton lower than a month ago, demand is no greater. There is a better feeling in scrap. Some heavy inquiries have come up for furnace coke for first half and for all of next year, and prospects are that a very large tonnage will be closed in the next two or three weeks. The Carnegie Steel Company is operating at a little above 80 per cent. of ingot capacity and other leading steel companies report some increase in operations.

Ferromanganese.—A sale of 300 tons of foreign 80 per cent. ferromanganese for delivery in the first half of next year is reported at a price about \$38, Baltimore. We quote 80 per cent. ferromanganese for delivery in first half of next year at \$38.25 to \$38.50, Baltimore, the freight rate for delivery in the Pittsburgh district being \$1.95 a ton. On small lots for shipment this year probably about \$37.50, Baltimore, could be done.

Ferrosilicon.—Prices continue to advance and sales of several carloads of 50 per cent. have been made at \$65, Pittsburgh, the market being very strong at that figure. We quote: 10 per cent., \$22; 11 per cent., \$23, and 12 per cent., \$24, f.o.b. cars Jackson, Ohio, or Ashland, Ky.

Skelp.—Prices are slightly weaker and a sale of 1000 tons of grooved steel skelp in narrow sizes has been made at slightly under 1.15c., delivered, Pittsburgh. We also note a sale of 500 tons of sheared iron plates at about 1.65c., Pittsburgh. We quote grooved steel skelp at 1.12½c. to 1.15c.; sheared steel skelp, 1.17½c. to 1.20c.; grooved iron skelp, 1.40c. to 1.45c., and sheared iron skelp, 1.60c. to 1.65c., all for delivery at consumers' mills in the Pittsburgh district.

Wire Rods.—The market continues dull with prices lower. Nearly all consumers are covered by contracts against which specifications are not satisfactory. We quote Bessemer, open hearth and chain rods at \$25 to \$25.50, Pittsburgh.

Steel Rails.—Of the order for 25,000 tons of standard sections for next year, placed by the Norfolk & Western Railroad, the Carnegie Steel Company will roll 12,000 tons and the balance of the order will be filled by the Cambria and Maryland Steel companies. It is stated that the orders for steel rails to be placed by the Pennsylvania, Baltimore & Ohio and other leading roads for next year will be heavier than for this year, and the rail mills look for some of these contracts to be given out in the near future. In the past week the Carnegie Steel Company received new orders and specifications against contracts for about 2500 tons of light rails. We quote standard sections at 1.25c. per lb. and light rails as follows: 8 and 10-lb. sections, 1.205c.; 12 and 14-lb., 1.205c.; 16, 20 and 25-lb., 1.16c.; 30 and 35-lb., 1.15c.; 40 and 45-lb., 1.105c.

Structural Material.—The local market has been very quiet in the past week and no important contracts have been taken by the structural interests in this district. The American Bridge Company has taken upward of 5000 tons of bridge work for two Western roads and a large job for Canada is in the market, on which local concerns are figuring. We quote beams and channels up to 15 in. at 1.15c. to 1.20c., Pittsburgh, the lower price being named on large orders.

Plates.—Some large contracts for steel cars have been placed in the past week and more are pending. The New York Central has placed 1500 steel hoppers with the American Car & Foundry Company, 1500 steel gondolas and 4000 box cars with the American Car & Foundry Company, 1000 with the Pullman Company and 500 with the Barney & Smith Car Company, making 11,500 cars placed by this road. The Buffalo, Rochester & Pittsburgh has placed 1000 steel centers for underframes with the Pressed Steel Car Company, while the Baltimore & Ohio Railroad has bought 2000 steel gondolas from the Cambria Steel Company, 1000 steel underframe cars from the Standard Steel Car Company and 1500 composite steel gondolas from the Pressed Steel Car Company. The Southern Railway has placed 1200 steel gondolas with the Pressed Steel Car Company, in addition to the 600 noted last week. The Carnegie Steel Company will roll the plates and shapes for all the cars to be built by the Pressed Steel Car Company and this will amount to 60,000 tons or more. Demand for plates from boiler shops and other consumers is only fair, and some low prices are being made on desirable orders coming up. The Jones & Laughlin Steel Company is furnishing 4000 tons of steel plate caissons, 4 ft. and 6 ft. in diameter, for the wharves and docks at Colon for the Panama Canal. We quote wide and narrow plates at 1.15c. on ordinary orders and 1.20c. in small lots, f.o.b. at mill. On a very desirable contract for large tonnage and attractive rolling specifications it is probable that the lower price named might be slightly shaded.

Sheets.—The low prices ruling for some months on black, galvanized and roofing sheets are certainly bringing out a heavier volume of business. Several of the larger mills report that actual orders booked in the past week, together with specifications received against contracts, have been larger than in any one week for some months. Some of the very large consumers are trying to cover their requirements through the first half of next year at to-day's prices. A few such contracts have been made, but as a rule the sheet mills are not willing to sell very far ahead, believing the market will improve after the first of the year. Prices of galvanized sheets are firmer than they have been for some time, due to dearer spelter. As a rule the sheet mills are operating at 60 to 65 per cent. of capacity. The full schedule of prices on black, galvanized and roofing sheets is given on a previous page.

Tin Plate.—The tin plate trade is not in very satisfactory condition. The mills have pretty well cleaned up old contracts, and consumers have not begun to specify against contracts placed in the past month or so for delivery in first quarter and first half of next year. At present the mills are not operating to more than about 45 per cent. of capacity, and this rate will not likely be increased until after the first of the year, when the mills will start to run on stock to fill contracts of the meat packers and can makers for next year. We continue to quote \$3.40 per base box, 14 x 20, for coke plates, f.o.b. at mill.

Bars.—Specifications against contracts for merchant steel bars are fairly heavy at present and shipments by the mills are larger than for several months. A little more firmness is shown by the mills. One local producer turned down an order for 1000 tons of steel bars at 1.05c., stating that the very lowest price it could make on the contract would be 1.10c. at mill. The actual orders sent to the mills in October for rolling were heavier than in any previous month this year. As yet there is no indication of a higher price, but the fact is pretty well settled that bottom of the market has been reached. New demand and specifications for iron bars are only fair, consumers still taking in only such quantities of iron bars as are wanted to meet current needs. We quote merchant steel bars at 1.10c. on desirable orders and 1.15c. for small lots. In very exceptional cases and for favorable specifications 1.05c. on steel bars at mill has been done, but some makers of steel bars state they have not gone below 1.10c. at mill. We quote common iron bars at 1.20c. to 1.25c., f.o.b. cars at mill.

Merchant Steel.—New orders and specifications received so far this month are fully as heavy as in the first half of October. Specifications against contracts are reported by the mills as only fair. Quotations, which are more or less shaded, are as follows: Iron finished tire, $\frac{3}{4}$ and $\frac{1}{2}$ in. and heavier, 1.40c.; under these sizes, 1.45c.; planished tire, 1.50c.; channel-tire, 1.70c., base; toe calk, 1.80c.; flat sleigh shoe, 1.45c.; concave or convex, 1.60c.; cutter shoe, tapered or bent, 2.15c.; spring steel, 1.85c.; machinery steel, smooth finish, 1.75c.

Railroad Spikes.—A leading Eastern railroad has placed a contract with a local maker for upward of 10,-

000 kegs of spikes, and the Great Northern Railroad is reported to be in the market for 7000 to 8000 kegs. Orders are coming in a little more freely. We quote railroad spikes at \$1.40 in base sizes for carload and larger lots, f.o.b. Pittsburgh.

Rivets.—The demand for both boiler and structural rivets is reported slightly better, while specifications are coming in a little more freely, probably due to the low prices ruling. We quote structural rivets at 1.50c. and boiler rivets at 1.60c., f.o.b. Pittsburgh; but on desirable orders these prices are shaded \$1 a ton.

Shafting.—Makers report that specifications against contracts for shafting from the implement makers and the automobile builders are heavier, while current orders are also showing a slight increase. We quote cold rolled shafting at 60 and 10 and 65 per cent. off in carload and larger lots, delivered in base territory.

Spelter.—Prices have advanced sharply in the past week and prime grades of Western spelter are now held at 6.40c., East St. Louis, equal to 6.52 $\frac{1}{2}$ c., Pittsburgh. A sale of about 100 tons was made early last week at 6.30c., East St. Louis, equal to 6.42 $\frac{1}{2}$ c., Pittsburgh.

Wire Products.—The wire trade is in very unsatisfactory condition. Jobbers and retailers are placing orders for wire and wire nails for only such quantities as are absolutely needed to cover current needs. There is no disposition on the part of the trade to contract ahead, owing to the weakness in the market. Low prices continue on wire and wire nails for delivery at Southern points which are reached by mills which have low rates of freight to such territory. We quote wire nails at \$1.55 to \$1.60; cut nails, \$1.50; galvanized barb wire, \$1.90; painted, \$1.55 to \$1.60; annealed fence wire, \$1.35 to \$1.40, and galvanized fence wire, \$1.65 to \$1.70, f.o.b. Pittsburgh, usual terms, freight added to point of delivery.

Merchant Pipe.—A local oil company has contracted for 30 to 35 miles of 6-in. line pipe with one of the independent mills. The report of an inquiry for 100 miles of 12-in. pipe is not confirmed. The High Grade Oil Company has placed 20 miles of 2-in. iron pipe and five miles of 3-in. iron pipe with a local mill, and the Philadelphia Company has placed three miles of 4-in. iron pipe with an Eastern mill. The H. C. Fry Glass Company, of Rochester, Pa., has placed five miles of 6-in. iron pipe with A. M. Byers & Company, Inc., of this city; the Ohio Fuel Supply Company, four miles of 6 in. with the Mark Manufacturing Company, and the Arkansas Natural Gas Company, five to six miles of 3 in. The new demand for merchant pipe is holding up very well, several local pipe mills reporting that shipments in October were the heaviest for some time. It is stated that prices on merchant iron and steel pipe are being maintained. The new lists of discounts on oil country goods recently issued covering the Eastern Oil Country, the Mid-Continent Oil Country, Illinois and Kentucky and the California Oil Country show an average reduction of about 5 per cent. from former prices.

Boiler Tubes.—Several local mills report increasing activity in boiler tubes in the last week or two. A local mill has taken a contract for the boiler tubes for 75 locomotives to be built by one of the Eastern roads. In merchant tubes prices are more or less shaded.

Coke.—Some heavy inquiries have come up for furnace coke for first half of 1912, and also for all of next year, and indications are that a very large tonnage will be closed up in the next week or two. A Mahoning Valley interest is in the market for 35,000 tons of blast furnace coke per month for all of next year, another Valley furnace interest for 12,000 tons per month, another for 25,000 to 30,000 tons per month for all of next year, and there is also a further inquiry from a Valley blast furnace interest for 12,000 to 14,000 tons of blast furnace coke per month. Two Eastern furnace companies are in the market for upward of 30,000 tons of coke per month, and it is likely a good part of this business will be closed in the near future. An Eastern steel company has bought a round tonnage of furnace coke for first half of next year at the reported price of about \$1.65 per ton at oven. A Valley furnace interest has practically closed for its requirements for next year, which will represent about 18,000 tons per month. Prices on standard grades of furnace coke for first half are about \$1.65 per net ton at oven, and for delivery through all of next year from \$1.70 to \$1.75 per net ton at oven is being quoted. There is also some inquiry for foundry coke, and the whole coke trade is more satisfactory as regards inquiries than for some time. We quote standard makes for furnace coke for spot shipment at \$1.55 and for November and December

shipment \$1.55 to \$1.60, per net ton, at oven. Standard makes of furnace coke for the first half are held at about \$1.65 to \$1.70. We quote standard makes of 72-hr. foundry coke for spot shipment at \$1.85 to \$2 and on contracts for first half at \$2.10 to \$2.40, per net ton at oven.

Iron and Steel Scrap.—It is stated that more scrap is moving from dealers to consumers than for some time. Bids are going in on the Pennsylvania and Baltimore & Ohio lists, and in some cases as high as \$12.25 on steel scrap is being quoted on these lists. We note sales of 3000 to 4000 tons of heavy steel scrap at prices ranging from \$12.10 to \$12.25, delivered. The sale of 500 tons of borings at \$8, noted last week, should have read \$8.50 per ton, delivered, borings being firm at this price. Dealers are quoting as follows, per gross ton, f.o.b. Pittsburgh, unless otherwise noted:

Heavy steel scrap, Steubenville, Follansbee, Sharon, Monessen and Pittsburgh delivery.	\$12.00 to \$12.25
No. 1 foundry cast.	12.25 to 12.50
No. 2 foundry cast.	11.25 to 11.50
Bundled sheet scrap, f.o.b. consumers' mill, Pittsburgh district	10.25 to 10.50
Re-rolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	12.50 to 12.75
No. 1 railroad malleable stock.	11.25 to 11.50
Grate bars	9.00 to 9.25
Low phosphorus melting stock.	15.25 to 15.50
Iron car axles.	20.50 to 21.00
Steel car axles.	16.00 to 16.25
Locomotive axles.	22.00 to 22.50
No. 1 busheling scrap.	11.00 to 11.25
No. 2 busheling scrap.	7.00 to 7.25
Old car wheels.	12.00 to 12.25
*Cast iron borings.	8.50
*Machine shop turnings.	9.00
†Sheet bar crop ends.	13.75 to 14.00
Old iron rails.	14.50 to 14.75
No. 1 wrought scrap.	12.00 to 12.25
Heavy steel axle turnings.	9.75 to 10.00
Stove plate.	9.00 to 9.25

*These prices are f.o.b. cars at consumers' mills in the Pittsburgh district.

†Shipping point.

Chicago

CHICAGO, ILL., November 14, 1911.

A more cheerful tone has developed as a result of the placing of car orders by a number of the railroads. The American Car & Foundry Company has orders for about 4000 cars to be built at its Western plant; the Pullman Company received of the New York Central order 2000 steel underframe box cars; the Haskell-Barker Car Company and the Western Steel Car & Foundry Company are understood to be engaged with substantial orders; the Chicago, Milwaukee & St. Paul has placed an order with the Bettendorf Axle Company for 500 steel underframes and the Armour Car Line is building 400 refrigerator cars at its own shops. It is estimated that as many more car orders are likely to be placed. It is accepted as significant of the extremes to which railroads have gone in delaying purchases that the promptest possible shipment is being urged in every instance. Some steel manufacturers are disposed to predict that the market will benefit not only by the actual tonnage of material required for the manufacture of the cars in question but that a general increasing of their own stocks by those who are furnishing any of the materials will add considerably to the business the mills will receive. Aside from car business the market shows no general improvement; in fact, prices in some instances are less firm. The placing of an order for 40,000 tons of rails with the Colorado Fuel & Iron Company by the Chicago, Burlington & Quincy is noted. Specifications for railroad bridge structural shapes are reported as being received in good volume.

Pig Iron.—The price at which Northern iron is being sold has established a rather sharp line between the activity in Northern and Southern irons. Southern iron continues to be held uniformly at \$10, Birmingham, for No. 2 for delivery into next year with all of the regular brands of iron available at that price. On this basis Southern iron delivered in Chicago and to points north of it is at a disadvantage and very little interest is being displayed, with correspondingly light sales. On the other hand, the inquiries for local iron and sales during the past week, particularly at Milwaukee and in the Northwest, have aggregated a fair tonnage. Sales have been made at Minneapolis on a basis of \$15.50 for iron delivered from Duluth, and sales of charcoal iron from Ashland are also noted. The price of \$14, f.o.b. furnace at Chicago, is now generally established. The business tentatively in sight has lent some encouragement to local furnaces and the opinion is expressed that the average selling price of pig iron has now been brought so low as to necessitate a firmer attitude on the part of furnaces in declining tonnage at lower quotations. We

quote for Chicago delivery, except for local irons, which are f.o.b. furnace, the following prices on prompt shipments:

Lake Superior charcoal.	\$16.50 to \$17.00
Northern coke foundry, No. 1.	14.50 to 15.00
Northern coke foundry, No. 2.	14.00 to 14.50
Northern coke foundry, No. 3.	13.50 to 14.00
Northern Scotch, No. 1.	16.00
Southern coke, No. 1 foundry and No. 1 soft.	14.85
Southern coke, No. 2 foundry and No. 2 soft.	14.35
Southern coke, No. 3.	14.10 to 14.35
Southern coke, No. 4.	13.85 to 14.10
Southern gray forge.	13.60 to 13.85
Southern mottled.	13.60 to 13.85
Malleable Bessemer.	14.35 to 14.50
Standard Bessemer.	17.00
Basic.	14.75
Jackson Co. and Kentucky silvery, 6 per cent.	16.40
Jackson Co. and Kentucky silvery, 8 per cent.	17.40
Jackson Co. and Kentucky silvery, 10 per cent.	18.40

Rails and Track Supplies.—In addition to the 20,000 tons of rails which the Chicago, Burlington & Quincy placed with the Illinois Steel Company, an order for 40,000 tons was awarded to the Colorado Fuel & Iron Company. Other Western roads have under consideration an aggregate tonnage which, if placed, will materially improve the mills' positions. Many thousands of kegs of track bolts and spikes are under contract, but specifications have been rather slow. We quote standard railroad spikes at 1.50c. to 1.55c., base; track bolts, with square nuts, 2c. to 2.10c., base, all in carload lots, Chicago; standard section Bessemer rails, 1.28c.; open hearth, 1.34c.; light rails, 40 to 45 lb., 1.16c. to 1.20½c.; 30 to 35 lb., 1.19½c. to 1.24c.; 16, 20 and 25 lb., 1.20½c. to 1.25c.; 12 lb., 1.25c. to 1.30½c.; angle bars, 1.50c., Chicago.

Structural Material.—The demand for architectural purposes is slowing down, as is to be expected at this season. The only contract for fabricated steel reported the past week was for 286 tons for the Victoria Theatre, Chicago, to be furnished by the Geo. E. Laubheimer Company. The principal support of current mill tonnage is from the specifications for bridge structural material and for shapes to apply on car orders. We quote for plain shapes, Chicago delivery, mill shipment, 1.33c. for the average carload business, and from store, 1.60c.

Plates.—With one exception, Western steel car plants have received orders which will provide for their capacity for 60 to 90 days. The plain material for these cars ordered from the mill totals above 50,000 tons. While the tonnage placed is not large, compared with the capacity of the mills, the requirement of immediate shipment is making the question of deliveries something of an issue. It is estimated that approximately one-half of the car orders in prospect have been placed. A continuance of the car-buying movement will undoubtedly strengthen the plate situation, in connection with which the market has thus far been pronouncedly weak. While prices varying widely, depending upon the desirability of the business offered, are current in this market, 1.33c., Chicago, continues to be the market level for carload business. This price we quote for Chicago delivery, mill shipment, and from store 1.60c.

Sheets.—A willingness on the part of local mills to meet prices emanating from Eastern points has brought a somewhat increased tonnage to this market. No betterment in the price situation can, therefore, be noted, and what the buyer is willing to pay continues to be a determining factor in the market. We quote Chicago prices as follows: Carload lots, from mill, No. 28 black sheets, 2.03c. to 2.08c.; No. 28 galvanized, 3.03c. to 3.08c.; No. 10 blue annealed, 1.53c. to 1.58c. Prices from store, Chicago, are: No. 10, 1.90c.; No. 12, 1.95c.; No. 28 black, 2.30c.; No. 28 galvanized, 3.35c.

Bars.—A slight increase in the tonnage of steel bars received by Western mills is noted. At the same time, prices, if anything, are softer. For ordinary business 1.28c., Chicago, will be done and where the business available is sufficiently desirable to establish a pressure of competition, concessions of \$1 a ton and over have been made. The low price of steel has undoubtedly resulted in the diverting of a portion of the bar iron tonnage to steel. We quote as follows, f.o.b. Chicago: Soft steel bars, 1.18c. to 1.33c.; bar iron, 1.15c. to 1.20c.; hard steel bars rolled from old rails, 1.15c. to 1.20c. From store: Soft steel bars, 1.55c. to 1.60c., Chicago.

Wire Products.—Wire nails and plain wire continue to be subject to the general market depression. Prices on wire nails as low as \$1.73 are reported and have been made in certain instances, but the average carload orders are being placed on the basis of \$1.78, Chicago. The demand for barb wire has fallen off somewhat and the rush in the fence wire trade has diminished. Jobbers' carload prices, which are also quoted to manufacturing buyers, are as follows, per

100 lb.: Plain wire, No. 9 and coarser, base, \$1.58; wire nails, \$1.78; painted barb wire, \$1.78 to \$1.83; galvanized, \$2.08 to \$2.13; polished staples, \$1.78 to \$1.83; galvanized, \$2.08 to \$2.13, all Chicago.

Cast Iron Pipe.—The lettings of cast iron pipe noted at Mound City and Hill City, Kan., have been placed with contractors but the orders for pipe have not yet been received. At Valley Falls, Kan., 300 tons is to be placed this week. We quote as follows, per net ton, Chicago: Water pipe, 4-in., \$26.50; 6 to 12-in., \$24.50; 16-in. and up, \$24, with \$1 extra for gas pipe.

Old Material.—Most consumers continue willing to buy occasionally in small quantities but not in sufficient volume to add any strength to the market. There is an increasing disposition to accept current quotations as the lowest ebb of the market and in this connection it may be noted that there has been little change the past week as compared with a continued decline through several weeks preceding. The principal scrap list now in the market is one from the Illinois Central Railroad offering 5000 tons; a small list carrying 300 tons from the Soo Line and one of 100 tons from the Chicago & Alton. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, per gross ton, as follows:

Old iron rails.....	\$14.50 to \$15.00
Old steel rails, rerolling.....	12.00 to 12.50
Old steel rails, less than 3 ft.....	10.75 to 11.25
Relaying rails, standard section, subject to inspection.....	24.00
Old car wheels.....	12.00 to 12.50
Heavy melting steel scrap.....	9.50 to 10.00
Frogs, switches and guards, cut apart.....	9.75 to 10.25
Shoveling steel.....	9.00 to 9.50
Steel axle turnings.....	8.00 to 8.50

The following quotations are per net ton:

Iron angles and splice bars.....	\$11.75 to \$12.25
Iron arch bars and transoms.....	13.00 to 13.50
Steel angle bars.....	8.75 to 9.25
Iron car axles.....	16.75 to 17.25
Steel car axles.....	15.00 to 15.50
No. 1 railroad wrought.....	10.00 to 10.25
No. 2 railroad wrought.....	9.00 to 9.25
Steel knuckles and couplers.....	9.25 to 9.75
Steel springs.....	9.50 to 10.00
Locomotive tires, smooth.....	13.50 to 14.00
Machine shop turnings.....	5.75 to 6.25
Cast and mixed borings.....	5.00 to 5.50
No. 1 busheling.....	7.75 to 8.00
No. 2 busheling.....	5.75 to 6.25
No. 1 boilers, cut to sheets and rings.....	6.50 to 7.00
Boiler punchings.....	12.00 to 12.50
No. 1 cast scrap.....	10.00 to 10.50
Stove plate and light cast scrap.....	8.50 to 9.00
Railroad malleable.....	9.50 to 10.00
Agricultural malleable.....	8.50 to 9.00
Pipes and flues.....	7.00 to 7.50

Philadelphia

PHILADELPHIA, PA., November 14, 1911.

Pig iron purchases have been light. While the volume of business coming to Eastern finishing mills has not made any marked change in the productive rate, a fair business is moving. Some further rail orders have been placed, and car and ship work have been more active. Eastern mills are resisting, quite strongly in instances, any further price concessions. Sheets have been in active demand and mills are fully engaged. Billets are quiet and less strength in prices is noted. Old material is practically at a standstill. Coke has been in better demand, particularly furnace coke for next year's delivery, but no large contracts have been reported closed.

Iron Ore.—Consumers hold off pending developments in connection with lower freights. Importations during the week included 9555 tons of Swedish and 4600 tons of New Brunswick ore.

Pig Iron.—From data gathered for the monthly meeting of the Eastern Pig Iron Association, it is reported that stocks on hand November 1 were about even with those of the previous month, a slight increase being noted on the yards of some consumers making their own pig iron. Orders aggregated slightly less in October than in September. The lack of any improvement in prices, notwithstanding the low stocks and urgent demand from some consumers, is considered rather discouraging, and it would not be surprising to hear of the blowing out of several merchant furnaces in this district by makers who contend that they are selling at a loss. A further factor in the possible blowing out of several stacks is the effort of consumers to have deliveries of basic iron deferred, some desiring this done into next year. Recent buying has been confined closely to small lots, with the same urgency for delivery as has prevailed in the past few weeks. Eastern Pennsylvania No. 2 X foundry of standard analysis moves freely at \$15, delivered, and

in instances continues to be shaded a few cents a ton. The bulk of the inquiry for larger quantities comes from the cast iron pipe interests, but a difference in views as to prices has restricted the placing of orders. Small lots of off grade irons continue to be moved at prices governed entirely by the class of material under negotiation. Few producers are willing to load up their order books for forward delivery at current prices, while consumers hold off hoping that some readjustment of ore prices will result in lower prices. Very little demand for forge iron comes from the rolling mills. There has been a material reduction in prices of standard analysis low phosphorus pig iron, small sales of which have been made at \$19.50, delivered, with \$19.25 acceptable for a round lot. Recent inquiries for basic are still pending, while no fresh demand is reported. The nominal price for basic is \$14.50, delivered, but this could, no doubt, be shaded. The following range is named for standard analysis irons, delivered in buyers' yards in this district, for shipment over the remainder of the year and extending into and through the first quarter of 1912:

Eastern Pennsylvania No. 2 X foundry.....	\$15.00 to \$15.25
Eastern Pennsylvania No. 2 plain.....	14.75 to 15.00
Virginia foundry.....	15.00 to 15.50
Gray forge.....	14.25
Basic.....	14.50
Standard low phosphorus.....	19.25 to 19.50

Ferroalloys.—Little movement in ferromanganese is reported. One small sale of German at a price slightly above \$38, delivered here, is reported. English is still pretty generally held at \$38.50, Baltimore, although small sales of speculative material are still heard of at concessions. Fifty per cent. ferrosilicon is quoted at \$63 to \$64, delivered here, but no sales are reported. Furnace ferrosilicon, with Bessemer limits as to phosphorus and sulphur, is quoted at \$27.30 to \$28.30, delivered here.

Billets.—The market is not as strong as appears on the surface. Business continues of the small lot order and while the larger producers name \$22.40, delivered, for basic open hearth rolling billets they are forced to meet competition from some of the smaller mills, who quote \$21.40, or lose the order. Forging billets, which have been in fair demand in small lots, are quoted at \$26.50 to \$27.50, delivered, according to specification.

Plates.—Mills are encouraged by the volume of business in sight for car work and boat building. An order for a large vessel has been placed with one of the Eastern yards, which will require 3000 to 4000 tons of plates and shapes. Builders are figuring on some 8 or 10 additional vessels, while the demand for car work continues to increase. Current orders do not show much change. Some consumers are endeavoring to place business for extended delivery at to-day's prices, but the mills in this district refuse to meet their views, nor will they generally sell at the low prices named by some makers. Prices for ordinary plates, delivered in this territory, range from 1.30c. to 1.40c., the inside figure, however, applying only to particularly desirable business.

Structural Material.—While actual orders recently placed have not been large more prospective work in buildings has developed in this territory. It is now stated that the new Stock Exchange building, for which plans are out, will require 2000 tons of material. The Dock street pier, now being estimated on, will take 1000 tons. Independent sectional bids, each requiring about 500 tons, are being taken for the proposed new erecting shop for the Baldwin Locomotive Works, at Eddystone. Eight units or sections are included under revised plans and one or more sections may be erected as required. No final decisions on this contract are expected until early in December. Several small bridges have come up for estimate, while bids are going in for a 2100-ton bridge for the Pennsylvania Railroad to span the Susquehanna River. The recent placing of several large contracts for structural work has had a tendency to strengthen the market and reports indicate less cutting of prices. Quotations are unchanged, 1.30c. to 1.40c. representing the full range of the market for plain shapes, delivered in buyers' yards in this district.

Sheets.—Eastern mills note an increasing tendency by consumers to place orders covering extended requirements, but sellers refuse to take business other than for early delivery. Current orders have been larger and mills are more fully engaged, some operating at full capacity. Western sheets are quoted on ordinary lots at 2.05c., delivered, for No. 28 gauge, while Eastern mills making smooth, loose rolled sheets easily obtain an advance of ¼c. to ½c. per lb. for such material for prompt shipment.

Bars.—New business of any marked proportion de-

velops slowly. The general demand appears to be confined to small lots for early delivery, for which current quotations are easily obtained. Prices of iron bars, delivered in this district, range from 1.20c. to 1.25c., while for the ordinary run of local business steel bars are quoted at 1.25c., delivered.

Coke.—Increased inquiry for furnace coke for the first half, as well as the entire year 1912, is noted. Buyers and sellers are, however, somewhat apart on their ideas of prices, and while \$1.65 to \$1.75 at oven is named by producers, sellers' ideas are around \$1.55 to \$1.60 for contract coke. Meanwhile spot sales are made at \$1.50 to \$1.55. Some little contracting for foundry coke, at \$2.15 to \$2.30, oven, is reported, but the quantities involved are not large. Spot foundry coke is available at \$2 at oven. The following range of prices, per net ton, is named for deliveries in this district:

Connellsville furnace coke.....	\$3.65 to \$4.05
Foundry coke.....	4.15 to 4.50
Mountain furnace coke.....	3.40 to 3.65
Foundry coke.....	3.95 to 4.40

Old Material.—Little business has been transacted. Mills take on only small lots, moving largely at bargain prices. Merchants who are filling in against short orders, placed at higher prices, frequently pay better prices for material than will consumers. Some small lots of heavy melting steel have been moved at \$11.50, delivered, although some mills are still willing to pay \$12 for strictly railroad steel. Occasional inquiry develops for No. 1 wrought scrap, better grades of which are held at \$14, delivered. The following range of prices about represents quotations at which the ordinary current business for prompt shipment can be done for delivery in buyers' yards, eastern Pennsylvania and nearby points, taking a freight rate from Philadelphia varying from 35c. to \$1.35, per gross ton, for shipment ranging from prompt to the remainder of the year:

No. 1 heavy melting steel scrap.....	\$11.50 to \$12.00
Old steel rails, rerolling (nominal).....	12.50 to 13.00
Low phosphorus heavy melting steel scrap.....	15.50 to 16.00
Old steel axles.....	17.00 to 17.50
Old iron axles.....	21.00 to 21.50
Old iron rails.....	15.50 to 16.00
Old car wheels.....	11.25 to 11.75
No. 1 railroad wrought.....	13.75 to 14.25
Wrought iron pipe.....	10.75 to 11.25
No. 1 forge fire.....	9.50 to 10.00
No. 2 light iron (nominal).....	6.00 to 6.50
Wrought turnings.....	8.00 to 8.25
Cast borings.....	7.50 to 7.75
Machinery cast.....	12.25 to 12.75
Railroad malleable (nominal).....	11.00 to 11.50
Grate bars, railroad.....	9.25 to 9.75
Stove plate.....	9.25 to 9.75

Cleveland

CLEVELAND, OHIO, November 14, 1911.

Iron Ore.—The ore shipping season is being brought rapidly to a close and very little will be sent from the head of the Lakes after this week. All boats of the Pittsburgh Steamship Company that are to take on ore cargoes this season are now on their way up and that company expects to ship its last cargoes not later than Saturday. The merchant ore firms have but a few more cargoes in odds and ends to bring down. We quote prices as follows: Old range Bessemer, \$4.50; Mesaba Bessemer, \$4.25; old range non-Bessemer, \$3.70; Mesaba non-Bessemer, \$3.50.

Pig Iron.—There is somewhat better inquiry for foundry grades in lots of 500 tons and under for delivery in the remainder of the year and in the first quarter. Quotations show no change. Several producers are not meeting the present low prices. Northern foundry No. 2 is quoted at \$12.75, Cleveland furnace, for outside shipment. In the Valley \$13 at furnace is the minimum quotation for No. 2 but sales of small lots are being made at \$13.25 to \$13.50. We note the sale of 1000 tons of No. 2 foundry to a northern Ohio consumer at \$12.75 for the remainder of the year and first quarter delivery. There are two inquiries from a nearby point, each for 500 tons of Nos. 1 and 2 for the first half delivery. An inquiry from Jackson, Mich., is for 300 tons of Nos. 1 and 2 for the same delivery. A few small sales of No. 2 Southern are reported at \$10, Birmingham, for delivery through the first quarter. An Ohio stove manufacturer is in the market for 1000 tons of No. 2 Southern for first half. An Ohio pipe manufacturer is understood to be picking up considerable low grade iron. Ohio silvery is in fair demand, but is being sold at lower prices for early delivery, being quoted at \$15 at furnace, for 8 per cent. silicon, for the remainder of the year. We quote as follows for prompt shipment and for the first quarter:

Bessemer.....	\$15.15
Basic.....	13.40
Northern foundry, No. 2.....	13.25
Gray forge.....	12.50
Southern foundry, No. 2.....	14.35
Jackson County silvery, 8 per cent. silicon.....	\$16.55 to 17.05

Coke.—The market is very dull in both foundry and furnace grades. Foundries are well covered for their requirements for the remainder of the year and there is practically no inquiry for contracts for the first half. Sales are mostly in carload lots. We quote standard Connellsville furnace coke at \$1.50 to \$1.55, per net ton, at oven, for prompt shipment and \$1.55 to \$1.60 for the remainder of the year. Connellsville 72-hr. foundry coke is held at \$1.90 to \$2.15 for prompt shipment and \$2.15 to \$2.35 for contract.

Finished Iron and Steel.—Mill agencies are doing a fairly good business in finished lines. While most orders are for small lots for immediate requirements, more disposition is being shown by some consumers to place small stock orders. Some consumers are beginning to feel that prices will go no lower and for that reason they are willing to add somewhat to their depleted stocks. While some of the steel bar mills seem more inclined to maintain 1.10c., Pittsburgh, as the minimum price on steel bars, the 1.05c. price is still being quoted for round lots with particularly desirable specifications. We note the sale of one 1000 ton lot at the latter price. The demand for plates has improved, mills getting a good tonnage from tank shops. Plate prices are weaker, the ruling quotations being from 1.10c. to 1.15c., Pittsburgh. The former price is for desirable orders. The demand for structural material is not active. While a fair volume of new building is in prospect, it is slow in coming out. The only new inquiry of any size is from the Cleveland Construction Company for 540 tons for a new power house in Ft. Worth, Tex. We quote structural material at 1.15c. to 1.20c., Pittsburgh. Sheets continue in fair demand. Sheet prices are steady, the minimum quotations being 1.85c. for No. 28 black and 2.85c. for No. 28 galvanized. The demand for hard steel bars is holding up well and the minimum quotation is 1.08c., Pittsburgh. Some orders for forging billets are being taken in one and two carload lots at \$26, Cleveland. Orders for iron bars are light and both local bar iron mills are shut down this week. We quote iron bars at 1.20c., Cleveland mill.

Old Material.—Little is being done in the scrap market. Consumers seem fairly well supplied for the present and are not looking for tonnage, although they are willing to buy what is offered them at attractive prices. Dealers are unwilling to sell at present prices except small lots that they are anxious to move. A local consumer is offering \$10.50 for heavy steel scrap but has secured only a small quantity at that price. The Norfolk & Western Railroad will close November 22 on about its usual tonnage. Dealers' prices per gross ton, f.o.b. Cleveland, are as follows:

Old steel rails, rerolling.....	\$12.25 to \$12.75
Old iron rails.....	14.00 to 14.50
Steel car axles.....	17.00 to 17.50
Heavy melting steel.....	10.75 to 11.00
Old car wheels.....	11.50 to 12.00
Relaying rails, 50 lb. and over.....	22.50 to 23.50
Agricultural malleable.....	10.50 to 11.00
Railroad malleable.....	11.00 to 11.25
Light bundled sheet scrap.....	9.50 to 10.00

The following prices are per net ton, f.o.b. Cleveland:

Iron car axles.....	\$18.50 to \$19.00
Cast borings.....	6.00 to 6.25
Iron and steel turnings and drillings.....	6.50 to 6.75
Steel axle turnings.....	7.25 to 7.75
No. 1 busheling.....	9.00 to 9.50
No. 1 railroad wrought.....	11.00 to 11.25
No. 1 cast.....	11.00 to 11.50
Stove plate.....	9.00 to 9.25
Bundled tin scrap.....	11.00 to 11.50

Cincinnati

CINCINNATI, OHIO, November 15, 1911.—(By Telegraph.)

Pig Iron.—There is a slightly better inquiry, and it is also reported that considerable small business has been booked under cover. As many contracts expire soon, it is quite probable that there will be a spurt of activity between now and January 1. Consumers' stocks are comparatively low and the furnaces are receiving more small prompt shipment orders than for some time. A local manufacturer will purchase soon about 600 tons of mixed foundry grades, and for first quarter shipment a central Ohio firm wants 1000 tons of No. 2 foundry. Michigan is furnishing more than the usual number of inquiries for small lots of both foundry and malleable, and from the St. Louis district is a request for 1000 tons of malleable that is expected to be placed with Ironton producers. For No-

vember shipment 1000 tons of No. 2 Southern foundry was taken by a southern Ohio melter at \$10, Birmingham. At this same price quite a number of smaller sales have been recorded, although in several instances deliveries were extended through the first half of next year. Southern No. 4 foundry and gray forge are very scarce and \$9.25 at furnace is the minimum quotation on these grades. While malleable is in better demand, the price remains at \$13, Iron-ton, for any shipment until April 1. Northern No. 2 foundry is stationary at \$13 at furnace, and a number of producers are booking first half business at this price. The most encouraging feature now is the increased railroad buying of both raw and finished materials. Based on freight rates of \$3.25 from Birmingham and \$1.20 from Iron-ton, we quote, f.o.b. Cincinnati, as follows, for prompt shipment:

Southern coke, No. 1 foundry and 1 soft..	\$14.00 to \$14.25
Southern coke, No. 2 foundry and 2 soft..	13.25 to 13.75
Southern coke, No. 3 foundry.....	12.75 to 13.25
Southern coke, No. 4 foundry.....	12.50 to 13.00
Southern gray forge	12.50 to 13.00
Ohio silvery, 8 per cent. silicon.....	16.95 to 17.20
Lake Superior coke, No. 1.....	14.70 to 14.95
Lake Superior coke, No. 2.....	14.20 to 14.45
Lake Superior coke, No. 3.....	13.70 to 13.95
Basic, Northern	14.20 to 14.45
Standard Southern car wheel.....	25.50 to 25.75
Lake Superior car wheel.....	19.00

(By Mail.)

Coke.—There is no new furnace coke business and orders for foundry coke are confined to small quantities. The movement on contracts already made is excellent and there are practically no requests to hold up shipments. Connellsville furnace coke is obtainable around \$1.50 per net ton at oven for prompt shipment, with the Pocahontas and Wise County brands generally bringing 10c. to 15c. above this price. Contract figures range from \$1.60 to \$1.75 in all three fields. Foundry coke remains between \$1.90 to \$2 per net ton at furnace for prompt or nearby movement, with some producers asking as high as \$2.40 for special grades for shipment during 1912. From \$2.15 to \$2.25 more nearly represents the average quotations on future business.

Finished Material.—Steel bars appear to be on the mend, and while orders continue to be for comparatively small tonnages the price is firmer at 1.10c., Pittsburgh, and where the specifications are not so desirable 1.15c. is asked in this territory. The local warehouse price on steel bars remains around 1.55c to 1.60c. Wire nails and sheets also show a slight improvement in the demand, but structural material is just holding its own. The local warehouse quotation on beams and channels, cut to lengths, is around 1.60c. to 1.70c.

Old Material.—The situation can best be expressed in the language of a local merchant who says: "The low prices prevailing on finished material will not allow the manufacturers to pay much for scrap at the present time. There may be a sentimental improvement in market conditions before the end of the year, but I am afraid that it will only be temporary and that present conditions will not improve for some time to come." What he says fairly represents the feeling among all local dealers. The minimum figures given below about represent what buyers are willing to pay for delivery at their yards in southern Ohio and Cincinnati, and the maximum figures the selling prices f.o.b. at yards:

No. 1 railroad wrought, net ton.....	\$9.50 to \$10.25
Casting borings, net ton.....	4.50 to 5.00
Steel turnings, net ton.....	5.50 to 6.00
No. 1 cast scrap, net ton.....	9.00 to 9.75
Burnt scrap, net ton.....	6.25 to 6.75
Old iron axles, net ton.....	16.25 to 16.75
Bundled sheet scrap, gross ton.....	5.75 to 6.50
Old iron rails, gross ton.....	13.00 to 13.75
Relaying rails, 50 lb. and up, gross ton.....	20.75 to 21.50
Old car wheels, gross ton.....	9.50 to 10.25
Heavy melting steel scrap.....	9.25 to 10.00

Birmingham

BIRMINGHAM, ALA., November 13, 1911.

Pig Iron.—Sales in the past week are reported as follows: A lot of 1000 tons of 1.75 to 2.25 per cent. silicon iron for shipment through the remainder of this year at \$9.50, Birmingham; 800 tons of 2.75 per cent. to 3.25 per cent. silicon iron for delivery extending into the first quarter at \$10.50, Birmingham; an aggregate of 2000 tons of Nos. 2 and 3 foundry iron for shipment covering the first quarter at a basis of \$10, Birmingham, for No. 2 foundry, and 1000 tons of high manganese iron with a high silicon content, at \$11, Birmingham. Negotiations for 1500 tons of No. 4 foundry and gray forge were also closed during the week, and, as a result, one of the leading producing interests now quotes \$9.50, Birmingham, for No. 3 foundry or any lower grades. Another large interest adheres to \$9.25

for forge and mottled, but the majority of producers are willing to accept a differential of 25c. per ton on a No. 3 foundry price for those grades. There has been no change in quotations on first half deliveries, and certain of the producers still insist that no contracts would be made for deliveries further advanced than the first quarter. For shipments to be made into strictly Southern territory, it is believed that a \$10, Birmingham, basis for advanced deliveries is firm, but in competitive territory it is very difficult to say just what can be done. The inquiry for all grades pending at this time is very light, yet, as is shown above, the aggregate of sales, though covering a wide range of territory, is fairly satisfactory. The stock returns as of November 1, which have just been compiled, show the aggregate accumulation in this State to have been decreased some 11,000 tons in the month of October. Of the total of approximately 211,000 tons now on hand, 132,000 tons is free foundry iron, 62,000 tons is covered by warrants, and 17,000 tons is basic iron. The number of active furnaces was the same November 1 as on October 1, and out of the 19 stacks in blast only 4 were producing basic iron. An additional stack has been blown in on basic since November 1 and 2 stacks will be blown in on charcoal iron before December 15. There is practically no complaint of the rate at which tonnage contracted for is being taken in, and stocks should be further reduced this month.

Cast Iron Pipe.—It has not been learned here to whom the requirement of some 5000 tons of water pipe for Colon, Panama, was awarded by the United States Government, but it is understood that such an award has been made. With this exception, no mention is made of any large contracts offering, and the requirement for maintenance work is comparatively light. However, the plants in operation continue to produce at the normal rate and prices have not been lowered. An aggregate of 1200 tons of water pipe, consisting of several small lots, was placed in this market during the week, and an equal tonnage is now under consideration. We continue to quote water pipe as follows, per net ton, f.o.b. cars here: 4 to 6 in., \$23; 8 to 12 in., \$22; over 12 in., average \$21, with \$1 per ton extra for gas pipe. These prices are subject to shading for large municipal contracts but are firm for such small orders as are now being placed.

Old Material.—The trading is light. Prices are weaker and we revise quotations as below, with the demand principally for light cast and steel grades. There has been but little interest manifested in old rails and axles for some months, while the old car wheels offered have been sold in the majority of cases direct to the car-wheel manufacturers, thereby eliminating the handling by dealers. We quote dealers' revised asking prices as follows, per gross ton, f.o.b. cars here:

Old iron axles (light).....	\$12.00 to \$12.50
Old steel axles (light).....	11.00 to 11.50
Old iron rails.....	11.60 to 11.50
No. 1 railroad wrought.....	9.50 to 10.00
No. 2 railroad wrought.....	8.00 to 8.50
No. 1 country wrought.....	6.00 to 6.50
No. 2 country wrought.....	5.50 to 6.00
No. 1 machinery cast.....	8.00 to 8.50
No. 1 steel.....	7.50 to 8.00
Tram car wheels.....	7.00 to 7.50
Standard car wheels.....	9.00 to 9.50
Light cast and stove plate.....	5.50 to 6.00

Coal and Coke.—With seasonable weather, the steam and domestic coal market has improved materially. The movement from all mine operations is considerably larger than for some months and prices being received are very satisfactory. There have been no transactions recently to affect the rate of production of foundry coke, but with the increase in active furnaces since November 1 additional ovens are producing 48-hour or furnace coke.

Finished Material.—The demand for round and bar iron continues very satisfactory and shipments against contracts are sufficient to keep all local mills in full operation. There is also a very heavy movement of wire products, especially nails and fencing. The business being placed in all these lines consists principally of small lots and considerable territory is being covered. Aside from the low level of prices, the general condition of the market is fairly satisfactory.

As a result of the bi-monthly settlement of the bar iron scale, the wages of Western puddlers for the next two months will remain the same as under the present schedule, \$5.50 a ton on a 1.2 cent card rate. The finishers' wages also remain unchanged. The mills of the Republic Iron & Steel Company and the Western Bar Association are affected.

Buffalo

BUFFALO, N. Y., November 14, 1911.

Pig Iron.—Indications point to a slight improvement of conditions in the pig iron market. More consumers are becoming interested and producers believe that there will be a steady though probably slow gain in tone and in volume of business. Large buyers are still very conservative, although some 500, 1000 and 2000-ton lots have been placed during the week. Orders entered by local furnaces aggregated 10,000 to 12,000 tons of foundry and malleable with a number of inquiries for good sized tonnages pending. The low prices that obtained three weeks or a month ago are not now being entertained by furnaces. Shipments on contracts are heavy and stocks on hand in local furnace yards have been steadily depleted during the past few weeks. More iron was shipped out in the first ten days of November than for any like period since July. The loading of Erie Canal shipments has been rushed to insure the movement of cargoes before the close of canal navigation for the season on November 15. For current and first quarter delivery we quote as follows, f.o.b. Buffalo:

No. 1 X foundry.....	\$13.75 to \$14.00
No. 2 X foundry.....	13.25 to 13.75
No. 2 plain.....	13.00 to 13.50
No. 3 foundry.....	13.00 to 13.25
Gray forge.....	13.00
Malleable.....	13.50 to 14.00
Basic.....	14.00 to 14.25
Charcoal.....	16.00 to 17.25.

Finished Iron and Steel.—There has been a perceptible change in sentiment, the general tone of the market being slightly better all along the line, with an increasing feeling among buyers that the bottom in prices has been reached. A fair volume of business is reported for prompt shipment. Prices are practically unchanged. Among the specialties there is an increase in the demand for chain. Business in fabricated structural lines is well maintained. Bids for steel for the Lawrence Hotel, Erie, Pa., are to be taken November 27, about 1200 tons being required. Bids are also to be received this week for steel called for by the revised plans for the City Convention Hall, Buffalo, and for the power house for the University of Michigan at Ann Arbor, about 1000 tons; also for about 100 tons for the Main Street Realty Company's building, Buffalo. The Lackawanna Bridge Company has been awarded contract for fabrication and erection of the steel for the theater and office building for the Shea Amusement Company, Buffalo, 350 tons. Bids for a number of other building projects have been submitted and are under consideration, including 2000 tons for the 15-story Buffalo, central exchange and office building for the New York Telephone Company and 200 tons for the Elmwood avenue substation exchange building for the same company at Buffalo.

Old Material.—A better feeling is observable among the dealers, who foresee larger business in the near future on account of the greater buying by railroad interests. Mills are now more inclined to take on stock, although shipments have not yet increased much in volume. Prices remain practically the same as quoted last week, but are being more firmly held by dealers. We quote as follows, per gross ton, f.o.b. Buffalo:

Heavy melting steel.....	\$12.50 to \$13.00
Low phosphorus steel.....	16.00 to 16.50
No. 1 railroad wrought.....	14.00 to 14.50
No. 1 railroad and machinery cast scrap.....	13.50 to 14.00
Old steel axles.....	18.50 to 19.00
Old iron axles.....	22.00 to 22.50
Old car wheels.....	13.00 to 13.50
Railroad malleable.....	12.75 to 13.00
Boiler plate.....	12.50 to 13.00
Locomotive grate bars.....	11.00 to 11.50
Pipe.....	9.25 to 9.50
Wrought iron and soft steel turnings.....	7.15 to 7.40
Clean cast borings.....	7.00 to 7.25

St. Louis

ST. LOUIS, Mo., November 13, 1911.

Decided optimism seems to rule the pig iron, coke and finished steel markets here and the suddenness of the transition from gravity to gayety is almost startling. Prices have not been advanced, but there is a steadiness of figures and a confidence in the future that will not be denied. The fact seems to be that buyers accept present prices as the lowest likely to be seen.

Pig Iron.—Although few sales are openly reported for the past week, it is positive that large interests are in the market and are taking considerable quantities for delivery through the first quarter and in some instances the first half. The quotations for No. 2 remain at \$10 to \$10.50, Birmingham, and it cannot be had for anything below. Some producers refuse to sell at less than

\$10.50 under any consideration. Sales reported include 800 tons of No. 2 soft for delivery through the first quarter. A malleable iron company is in the market for 1000 tons of malleable pig iron.

Coke.—While the total of sales runs into considerable figures, the quantities and the buyers are being withheld for the present. There is a firmness in prices which promises an advance from those now quoted, which are \$1.50 for 48-hr., \$1.90 to \$2.15 for 72-hr. prompt and \$2.10 to \$2.35 for first half delivery.

Finished Iron and Steel.—The better feeling in finished products is very great as a result of the orders which are being placed or are in prospect, though the requirements of immediate shipment continue as pressing as ever. There is practically no buying for stock, in spite of the increase in the total, but there is a belief that such buying will begin before long. Structural tonnage is growing larger every day, but every ton is going forward under high pressure for delivery. The bar and plate demand is fairly good and is participating to a measurable extent in the activity noted in other lines. Steel rails present no new orders of moment, but there are inquiries in the market for interurban purposes. Light rails continue to show improvement from the mining interests. Track fastenings are in good request for the season at firm prices.

Old Material.—An improved tone is observed in the scrap market, partly due to the optimism in new products and partly to the fact that cold weather is likely to cut off the supply somewhat. The Wabash, Vandalia, Mobile & Ohio and Southern lists reported last week were closed at prices which showed no improvement over previous figures. This week's lists include 300 tons by the Mobile & Ohio and 200 tons by the Chicago & Eastern Illinois. In general the outlook for better prices before long seems to be fairly good. Dealers' prices, f.o.b. St. Louis, per gross ton, we quote as follows:

Old iron rails.....	\$12.30 to \$12.50
Old steel rails, rerolling.....	11.50 to 12.00
Old steel rails, less than 3 ft.....	10.00 to 10.50
Relaying rails, standard section, subject to inspection.....	22.50 to 23.00
Old car wheels.....	11.50 to 12.00
Heavy melting steel scrap.....	10.00 to 10.50
Frogs, switches and guards cut apart.....	10.00 to 10.50

The following prices are per net ton:

Iron fish plates.....	\$10.00 to \$10.50
Iron car axles.....	17.00 to 17.50
Steel car axles.....	15.00 to 15.50
No. 1 railroad wrought.....	10.25 to 10.75
No. 2 railroad wrought.....	9.25 to 9.75
Railroad springs.....	9.25 to 9.75
Locomotive tires, smooth.....	13.00 to 13.50
No. 1 dealers' forge.....	7.00 to 7.50
Mixed borings.....	5.00 to 5.50
No. 1 busheling.....	8.50 to 9.00
No. 1 boilers cut to sheets and rings.....	7.00 to 7.50
No. 1 cast scrap.....	8.50 to 9.00
Stove plate and light cast scrap.....	7.00 to 7.50
Railroad malleable.....	7.50 to 8.00
Agricultural malleable.....	6.50 to 7.00
Pipes and flues.....	7.50 to 8.00
Railroad sheet and tank scrap.....	7.00 to 7.50
Railroad grate bars.....	6.50 to 7.00
Machine shop turnings.....	6.50 to 7.00

The German Iron Market

BERLIN, November 3, 1911.

Prices are firmly held, and a higher tendency is noted in a few cases. The Siegerland Ore Syndicate several days ago raised the price of specular and brown iron ores, and is expected to advance other grades in a few days. The advances already made range between 7 and 23 cents a ton. The plate convention is also expected to advance prices 2 to 3 marks at an early date and at the same time a proposal will be made to prolong the convention to June 30, 1912. The new Pig Iron Syndicate has now given out its prices for the different sections of the country. For North Germany the following prices will prevail: Luxemburg foundry 49 to 50 marks; hematite, 78.50; foundry No. 1, 75.50; foundry No. 3, 73.50. Scrap iron has risen a little, as the steel mills are laying in their winter supply.

German Works Well Employed

The works are well employed and new business continues to come in at a good pace. Orders for semi-manufactured products are still received steadily from both the home and the foreign market and calls for delivery are coming in rapidly. The demand for structural shapes shows little or no let-up upon the approach of winter, inasmuch as building operations continue active.

Bar mills are quite busy and have work till the opening of the spring season. Prices have further hardened, and it is said to be difficult to place orders under 105 marks. The foreign market is taking large amounts of band iron; prices have improved a little, but are still unsatisfactory. The plate market continues active. From the Silesian district it is reported that the volume of business in construction-shop plates and heavy commercial grades is steadily increasing, and in many cases it is difficult for buyers to get accommodation. Many shipyards and manufacturers of locomotives and other machinery have already sent in orders that they had been preparing for next spring's business. Works in that district running on armor plates are getting considerably more to do.

Manufacturers of gas and boiler tubes continue busy, but at very low prices. For export, prices are better than for the home market. Recent yearly reports of tube companies show unsatisfactory results. Somewhat similar conditions prevail with respect to wire rods—plenty to do, but at low prices; in this case foreign prices are actually unremunerative. In drawn wire and wire nails there is no complaint as to orders, but prices remain at or near the cost of production. In most branches of the hardware trade business is good. The export trade with Turkey and Italy has been sharply cut down by the war.

The Steel Works Union has just published the statistics of production of Class B products for September. The figures are the largest ever recorded for any one month. Shipments of bars scored a new record with 324,166 tons, which was 44,000 tons more than for September, 1910. The movement of plates reached 93,060 tons, a figure exceeded by only two previous months, namely, May and August. Shipments of wire rods amounted to 68,924 tons, again almost a record, only May having exceeded it by about 2,370 tons. Tubes made a new record with 17,700 tons and the shipments of castings and forgings were also the highest ever known, having reached 49,785 tons.

The Steel Syndicate Arranging to Continue

It now appears that the Steel Works Union, contrary to the first reports, did take action regarding its renewal at its meeting of about ten days ago. It appointed various committees to prepare the different sections of the work for submission to a general meeting to be held later in the month. The committee on allotments has asked the different works to hand in their demands by the 10th, and then the committee will begin work on its extremely difficult task about the middle of the month. A foretaste of what difficulties lie before it is afforded by the news that the Gelsenkirchen Company and the Thyssens are asking for new allotments of 1,000,000 tons of steel for their new works in Luxemburg and Lorraine. It is understood that a number of establishments are not yet in a position to formulate their demands for allotments, inasmuch as they are still negotiating with other concerns about fusions or community-of-interest arrangements, and their demands will depend upon the outcome of these operations. It is said that at least a dozen companies are thus situated. At this meeting of the Union a general talk on the question of prolonging the organization showed that all the members are most anxious to have it continued, and most of them want a renewal to 1920. It has been variously assumed that the Union would be renewed only to the time when the Coal Syndicate expires, that is, to 1915; but at this meeting nobody seemed to demand such a provisional prolongation. At another point this meeting also showed different results than had been looked for. It had been often said in the trade press that many important works would demand, as an essential condition for the renewal of the Union, that Class B products be fully syndicated. At present allotments are made in these, but prices are not fixed by the Union and the mills do their own marketing. It appears that the informal talk at the meeting in question convinced the members that there was no prospect whatever for the full syndication of these products, and that idea has apparently been dropped.

The Belgian market continues strong. According to a dispatch of yesterday from Brussels, the price of foundry iron has been marked up two francs and steel-making qualities one franc. The export market also continues to register rising prices. It is expected that the export price of bars will soon reach 98 to 100 shillings. There is a big demand for plates and the export price has risen to 106 shillings for steel and 108 for iron plates. The mills are very busy in most forms of steel and orders are coming in so briskly that not a few of them can accommodate no more till after the end of the year.

Boston

BOSTON, MASS., November 14, 1911.

Old Metals.—No change of any sort is noted in the scrap metal market. Buying is from hand to mouth, in small quantities. The prices quoted below are those offered by the large dealers to the producers and to the smaller dealers and collectors, per gross ton, carload lots, f.o.b. Boston and other New England points, taking Boston rates from eastern Pennsylvania points. In comparison with Philadelphia prices the differential for freight of \$2.30 a ton is included. Mill prices are approximately 50 cents a ton more than dealers' prices.

Heavy melting steel.....	\$9.50 to \$10.00
Low phosphorus steel.....	11.45 to 11.95
Old steel axles.....	14.00 to 14.50
Old iron axles.....	17.00 to 18.00
Mixed shafting.....	12.75 to 13.25
No. 1 wrought and soft steel.....	10.50 to 10.75
Wrought iron pipe.....	8.75 to 9.00
Skeleton (bundled).....	7.00 to 7.50
Cotton ties.....	7.00 to 7.50
No. 2 light.....	4.50 to 5.00
Wrought turnings.....	5.00 to 5.50
Cast borings.....	4.50 to 5.00
Machinery, cast.....	12.50 to 13.00
Malleable.....	9.25 to 9.75
Grate bars.....	6.00 to 6.50
Stove plate.....	8.00 to 8.50

New York

NEW YORK, November 15, 1911.

Pig Iron.—Several transactions of considerable size are reported for the past week, Eastern Pennsylvania and Buffalo furnaces securing the major part. There has been also a good aggregate of small orders. Pipe foundries have been buyers of both Northern and Southern irons, one lot of 5000 tons being taken by the largest interest, while another company bought several thousand tons. On Southern pipe iron a delivered price of about \$14 on the Delaware River is reported. A New England foundry that has been in the market for high phosphorus iron closed for 3500 tons, the business going to a Lehigh Valley producer. Deliveries on most of the business recently closed extend over the first quarter of 1912. A 2000-ton contract for malleable iron for delivery at a New York State plant was taken by a Buffalo furnace company. In Connecticut a machinery foundry is in the market for 1000 tons and one plant of a large pump interest is about to buy several hundred tons. The scale of foundry operations in this district remains around 60 per cent, and there is little disposition on the part of melters to cover far ahead. Contracts running over the first half of next year are exceptional. Production in Eastern Pennsylvania has been reduced by the blowing out of one furnace—No. 2 Crane at Catasauqua—but in Virginia Buena Vista furnace has blown in. Quotations are as follows for Northern iron at tide-water: No. 1 foundry, \$15.25 to \$15.50; No. 2 X, \$14.75 to \$15.25; No. 2 plain, \$14.50 to \$14.75. For Southern iron we quote \$15 to \$15.25 for No. 1 foundry and \$14.50 to \$14.75 for No. 2 foundry.

Finished Iron and Steel.—The scarcity of inquiries of some size for finished material and the low scale of prices continue to be absorbing topics. Claims of lower prices than have hitherto been ruling are made but it is probable that in a number of cases contributing circumstances are overlooked. For example, if a fabrication price for structural material of \$34 per ton were quoted at a point where the freight rate from Pittsburgh is say \$2 per ton, it is figured that the fabrication itself may be placed at \$10 per ton, thus making the plain material \$22 per ton or 1.10c. per pound at mill. Rumors that steel bars are 1.05c. at mill could not be substantiated, and as a matter of fact emphatic statements were forthcoming from reliable sources that no quotations below 1.10c., Pittsburgh, are being made for bars. The market for plates and shapes seems to be 1.15c., with most of the business placed at 1.20c. and higher. The volume of business has not been reduced. In view of the statement some weeks ago that \$38 for some 2000 tons of fabricated material was very low, it is interesting to record the purchase late last week of about 550 tons of shapes at \$37.75 per ton. New York. Plate mills have more business than a week or two ago. Some of the structural work on which decision is expected in the early future is the following: Addition to Cooper Union School, Third avenue, 1200 tons; Wyckoff Building, 12 stories, 600 tons, Fifty-fourth street and Park avenue; Taylor Building, Eighty-third street, 1500 tons; two bridges for the Erie Railroad, Western division, 400 tons; an apartment house being built, it is stated, by the Car-

negie Construction Company, 800 tons, and for three sections of the New York subway, 18,500 tons of riveted steel and shapes and 3300 tons of rods and bars for reinforced concrete. Some of the structural awards since last week's report are: Seamen's Church Institute, Coenties slip, 1500 tons, to the Eastern Steel Company; two bridges at Elizabethport, N. J., for the Central Railroad of New Jersey, 400 tons, to the Phoenix Bridge Company. New York Central so-called suburban area, 300 tons, to the McClintic-Marshall Construction Company; building for a glass factory at Washington, Pa., 200 tons, understood to have been given to the Penn Bridge Company, and Public School No. 61, New York City, 500 tons, is announced as going to the American Bridge Company. Quotations are: Steel bars, 1.26c. to 1.31c.; plates and plain structural material, 1.31c. to 1.36c.; bar iron, 1.20c. to 1.25c., all New York. Plain material and plates from store, New York, 1.60c. to 1.70c.

Cast Iron Pipe.—Private buyers are showing more interest in the market. A large gas company has submitted specifications, on which bids are being asked, for nearly 15,000 tons of pipe for next year's delivery, which is asserted to be a larger quantity than has ever before come out for spring delivery in this locality at this time of the year. Glens Falls, N. Y., is asking for prices on 550 tons of Class B water pipe, 4 to 10 in., mostly 10-in. Carload lots of 6-in. continue to be quoted at \$21 to \$22 per net ton, tidewater.

Old Material.—Although so few transactions are reported that the market is practically at a standstill, the sentiment is better. The feeling strongly prevails that prices are at bottom and that even a moderate demand would be likely to bring about some advance. Dealers' prices, per gross ton, New York and vicinity, are continued as follows:

Old girder and T rails for melting.....	\$9.25 to \$9.50
Heavy melting steel scrap.....	9.25 to 9.50
Relaying rails.....	20.00 to 21.00
Rerolling rails (nominal).....	11.25 to 11.75
Old iron car axles.....	19.00 to 19.50
Old steel car axles.....	15.00 to 15.50
No. 1 railroad wrought.....	11.00 to 11.50
Wrought iron track scrap.....	10.50 to 11.00
No. 1 yard wrought, long.....	10.25 to 10.75
No. 1 yard wrought, short.....	9.25 to 9.75
Light iron.....	3.75 to 4.25
Cast borings, clean.....	5.50 to 6.00
Mixed borings and turnings.....	4.75 to 5.25
Wrought turnings.....	5.75 to 6.25
Wrought pipe.....	8.50 to 9.00
Old car wheels (nominal).....	9.50 to 10.00
No. 1 heavy cast, broken up.....	10.00 to 10.50
Stove plate.....	7.75 to 8.25
Locomotive grate bars.....	7.75 to 8.25
Malleable cast.....	9.75 to 10.25

Ferroalloys.—The ferromanganese market is quiet, though a little stronger, the price asked for 80 per cent. going to \$38.50, Baltimore, with confidence that it would be obtained. There was inquiry for spot delivery at \$37.75 to \$38.25, Baltimore, while for forward delivery from \$38.25 to \$38.50 is quoted. For ferrosilicon some little inquiry is in hand for 50 per cent. for delivery over the remainder of the year and for about 400 tons for use in Pittsburgh next year. One seller placed the price flatly at \$66, Pittsburgh, while others quoted from \$64 to \$65. Indications are that the market will hold the present price and possibly become stronger.

Metal Market

NEW YORK, November 15, 1911.

The Week's Prices

		Cents Per Pound for Early Delivery.					
Copper, New York.		Electrolytic.		Tin.		Lead.	
Nov.	Lake.	Nov. York.	Nov. York.	Nov. York.	Nov. York.	Nov. York.	Nov. York.
9.....	12.60	12.50	42.10	4.25	4.15	6.40	6.25
10.....	12.75	12.60	41.90	4.25	4.15	6.45	6.30
11.....	12.75	12.62½	42.10	4.25	4.15	6.45	6.30
12.....	12.75	12.62½	42.45	4.25	4.15	6.50	6.30
13.....	12.75	12.62½	42.65	4.25	4.15	6.60	6.45
14.....	12.75	12.62½	43.15	4.25	4.15	6.60	6.45

All nonferrous metals except lead have advanced. Copper is very firm. Spelter has advanced 20 points and is scarce for prompt delivery. An excellent demand for pig tin for future delivery has developed.

Copper.—The copper market is very firm as the result of the statement of the Copper Producers' Association, which showed a decrease instead of an expected increase of stocks. The report strengthened the feeling here and abroad among dealers, producers and consumers. For two or three days after the appearance of the report the market was unsettled but with a decided tendency upward. To-day it is quieter, the demand apparently being pretty well satisfied.

Prices to-day are 12.62½c. for electrolytic and 12.75c. for Lake copper. Exports of copper for the month to date total 12,131 tons. In London to-day the price for spot is £56 16s. 3d. and for three months £57 11s. 3d.

Pig Tin.—For pig tin a very fair demand has developed, more especially for future delivery. There is some inquiry for spot. Consumers are beginning to take a more lively interest in the situation, largely because of being disturbed over the report from the other side that the syndicate may send the price higher. Tin to-day stood at 43.15c., having advanced steadily during the week from 42.10c. on November 8. The London market quoted tin to-day at £197 5s. for spot tin and £188 15s. for futures. The arrivals so far this month have been 1383 tons with 1090 tons reported afloat.

Tin Plates.—A livelier interest in tin plates is reported with news of importance in the statement that the large manufacturers of tin cans are making known their specifications for next year. A general improvement in the market for tin plates is imminent in the opinion of authorities, consumers inquiring freely. The price of tin plates laid down at Swansea, Wales, is reported as 13s. 3d. The price in New York for 100 lb. coke plates remains the same at \$3.64.

Lead.—The lead market is very firm, the prices remaining unchanged at 4.15c. in St. Louis and 4.25c. New York. A week ago concessions could be obtained but none were given at the close of this week.

Spelter.—The scarcity of spelter has become greater than ever, various reasons being ascribed for the scarcity. The supply is said to be affected by a strike in the ore district, as there are hints of manipulation. Whatever the cause, it contributes to a scarcity which already existed. There was little spelter offered in the New York market and those who had it asked 6.60c. In St. Louis 6.45c. was asked.

Antimony.—Dull and stagnant describes the antimony situation. Hallett's is a little lower at 7.65c.; Cookson's is 8c. Chinese and Hungarian grades are weak from 6.75c. up.

Old Metals.—The demand is improving and dealers' selling prices are hardening, but nominally unchanged as follows:

	Cents per lb.
Copper, heavy and crucible.....	11.75 to 12.00
Copper, heavy and wire.....	11.37½ to 11.50
Copper, light and bottoms.....	10.50 to 10.75
Brass, heavy.....	8.00 to 8.25
Brass, light.....	6.50 to 6.75
Heavy machine composition.....	10.25 to 10.50
Clean brass turnings.....	7.75 to 8.00
Composition turnings.....	8.50 to 9.00
Lead, heavy.....	4.15
Lead, tea.....	3.90
Zinc, scrap.....	4.50

Chicago

NOVEMBER 13.—The past week has developed a slightly better tone in the metal market, and copper and tin prices are fractionally higher. Spelter continues to be strongly supported and producers are slow to quote on orders. We quote at Chicago: Casting copper, 12.37½c. to 12.50c.; Lake, 12.62½c. to 12.75c., in carloads, for prompt shipment; small lots, ¾c. to ¾c. higher; pig tin, carloads, 42.50c.; small lots, 45.50c.; lead, desilverized, 4.25c. to 4.30c., for 50-ton lots; corrodng, 4.50c. to 4.55c. for 50-ton lots; in carloads, 2½c. per 100 lb. higher; spelter, 6.30c. to 6.35c.; Cookson's antimony, 9.25c., and other grades, 8.25c. to 8.75c., in small lots; sheet zinc is \$8, f.o.b. La Salle, in carloads of 600-lb. casks. On old metals we quote buying prices for less than carload lots: Copper wire, crucible shapes, 10.75c.; copper bottoms, 9.62½c.; copper clips, 10.50c.; red brass, 9.75c.; yellow brass, 7.50c.; lead pipe, 3.85c.; zinc, 4.50c.; pewter, No. 1, 26c.; tinfoil, 32c.; block tin pipe, 36c.

St. Louis

NOVEMBER 13.—There is decisive firmness as compared with last week. Spelter, after a slight recession, firmed up again and to-day was steady at 6.40c. Lead is firm at 4.15c., with some sellers asking 4.20c. Tin is higher at 42.35c. Lake copper shows up strong at 13.05c., while electrolytic has advanced to 13c. Cookson's antimony is quotable at 8.35c. In the Joplin district zinc blende, selling on the contract basis fixed on the previous week's East St. Louis spelter average, brought \$52.05. The basis price for 60 per cent. metallic content grades was \$47.79. The top price in the open market was \$49, which is higher than any price paid before this year. Calamine prices were the strongest of the year, ranging from \$24 to \$27 basis of 40 per cent. metallic zinc. The top price paid was \$33. Lead

ore was unchanged at \$56 to \$57 per ton. Zinc producers are considering strongly the further curtailment of the output and will reach a decision during the week. On old metals we quote: Light brass, 4c.; heavy brass and light copper, 8c.; heavy copper and copper wire, 9c.; zinc, 3c.; lead, 3.25c.; pewter, 20c.; tinfoil, 29c.; tea lead, 3c.

Iron and Industrial Stocks

NEW YORK, November 15, 1911.

The announcement of the United States Circuit Court's plan for the disintegration of the American Tobacco Company was received with so much satisfaction by financial interests that a strong upward movement was immediately inaugurated on the stock market. Quite a number of iron and industrial stocks showed sharp advances during the week. Steel common rose from 58½ to a maximum of 65½ and the preferred from 107¼ to 110¼; Car & Foundry common from 50½ to 54½; Allis-Chalmers preferred from 11 to 14. American Can preferred made a notable gain, advancing to the highest price ever recorded for this stock, with reports that plans are being considered for the payment of part of the accumulated dividends. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chalm., com...	3¼ - 3¼	Pressed Steel, com...	31¼ - 33
Allis-Chalm., pref...	11 - 14	Pressed Steel, pref...	96¼ - 98
Beth. Steel, com...	29 - 31	Railway Spring, com...	29¼ - 32¼
Beth. Steel, pref...	57 - 58½	Railway Spring, pref...	101
Can, com...	10½ - 12½	Republic, com...	20¼ - 23
Can, pref...	88 - 92¼	Republic, pref...	79¼ - 82
Car & Foundry, com...	50½ - 54½	Sloss, com...	41 - 43
Car & Foundry, pref...	116½ - 116¾	Pipe, com...	12¼ - 13¾
Steel Foundries...	31 - 32¼	Pipe, pref...	42¼ - 43¼
Colorado Fuel...	27¼ - 29	U. S. Steel, com...	58¼ - 65
General Electric...	152¼ - 155¼	U. S. Steel, pref...	107¼ - 110¼
Gr. N. Ore Cert...	42 - 43¼	Westinghouse Elec...	65 - 67¼
Int. Harv., com...	102¼ - 112	Va. I. C. & C...	61¼
Int. Harv., pref...	121 - 122	Am. Ship, com...	48
Int. Pump, com...	30 - 34¼	Chic. Pneu. Tool...	45 - 46
Int. Pump, pref...	82 - 83	Cambria Steel...	43¼ - 44
Lackawanna Steel...	30	Lake Sup. Corp...	27¼ - 28¼
Locomotive, com...	35 - 37	Crucible Steel, com...	10¼ - 11½
Locomotive, pref...	102¼ - 103¼	Crucible Steel, pref...	75¼ - 80¼
Nat. En. & St., com...	15 - 16¼	Harb. Wk. Ref., pref...	96¼
Nat. En. & St., pref...	94¼ - 96¼		

Dividends Declared

The Ashton Valve Company, regular quarterly, 1½ per cent., payable November 15.

The Niles-Bement-Pond Company, regular quarterly, 1½ per cent. on the common and preferred stocks; the dividend on the preferred stock, payable December 15 and on the common December 20.

The Pratt & Whitney Company, regular quarterly, 1½ per cent., payable December 15.

The Studebaker Corporation, regular quarterly, 1¾ per cent. on preferred stock, payable December 1.

The Harbison-Walker Refractories Company, ½ per cent. on the common stock, payable December 1.

National Founders' Meeting

The present condition of business and the relation of government to business operation are leading topics before the fifteenth annual meeting of the National Founders' Association in session, as this issue goes to press, in the Hotel Astor, New York City. The liability of employees for industrial accidents promises also to be discussed at length and a paper is scheduled on molding, machines and automobile castings. The deliberations of the administrative council on Tuesday and the report of the Wednesday morning session will be withheld so that the meeting may be treated as a whole next week. Mention may, however, be made of the unusual progress made by the association as indicated in an addition of 61 members in the past year. Forty covers were placed for the "alumni" dinner Tuesday evening and at this writing President O. P. Briggs' address is being listened to by a large audience. The feature of the alumni dinner was the presentation to C. Birmingham, Canadian Locomotive Company, Ltd., of a large silver punch bowl.

The Crane Iron Works, which operates a railroad between blast furnaces in Lehigh County, Pa., has appealed to the Commerce Court to set aside an order of the Interstate Commerce Commission refusing application to have the road recognized as a common carrier and entitled to through rates and joint routes over the Jersey Central and other railroads. The company is a subsidiary of the Empire Steel & Iron Company.

October Copper Production and Stocks

The report of the Copper Producers' Association for October has surprised the trade. It shows a decrease during the month of 5,897,214 lb. in the stocks of copper held in this country, whereas a substantial increase had been expected. Following is the statement:

	Pounds.
Stock of marketable copper of all kinds on hand at all points in the United States, October 1.....	140,894,856
Production of marketable copper in the United States from all domestic and foreign sources in October....	118,255,442
Deliveries of marketable copper during October:	
For domestic consumption.....	64,068,307
For export	60,084,349
Total	124,152,656
Stock of marketable copper of all kinds on hand at all points in the United States, November 1.....	134,997,642

The reduction in stocks was caused by an increase in domestic consumption of 6,756,723 lb. and an increase in foreign consumption of 9,260,338 lb., while the increase in production was but 2,666,492 lb. The increase in stocks in September was 7,453,355 lb.

Bankruptcy for some railroads and a deterioration in the efficiency of others were forecasted at Washington, November 9, before the Employers' Liability and Workmen's Compensation Committee by Gardiner Lathrop, counsel for the Atchison, Topeka & Santa Fé Railroad. He expressed grave doubt as to the probability of obtaining authority from the Interstate Commerce Commission to make increases in rates, which, he said, would be imperative to meet the cost of the proposed insurance fund to compensate employees. Mr. Moon of the committee said that the committee could make such recommendations that would force the commission to take into account the added burden upon the roads.

The ratification of the merger of the Southern Iron & Steel Company and the Alabama Consolidated Coal & Iron Company which was expected last week was postponed owing to a complication. The organized Dutch bondholders of the Southern Iron & Steel Company, at a meeting held October 30, rejected the plan of reorganization. A member of the reorganization committee, who is now abroad, is expected to confer with the bondholders at Amsterdam. The committee says that it has deposits of 60 to 70 per cent. of the securities of the two companies and that the carrying out of the merger is assured.

The Anniston Iron Corporation, Anniston, Ala., as the result of action advised by the board of directors, has been placed in the hands of M. H. Maury, its general manager, and J. P. Carrington, vice-president Woodstock Iron Company, as receivers. The plant will be kept in operation. The total liabilities are placed at \$60,000. The Lynchburg interest in the ownership of the corporation is not involved other than to the extent of stock holdings.

The Alleghany Ore & Iron Company, Iron Gate, Va., which on November 1 took over Buena Vista furnace from the lessee, the Oriskany Ore & Iron Corporation, put it in blast on November 8. It will be operated on car wheel, high manganese foundry and other special irons. The company's Iron Gate furnace will be blown out for repairs in the latter part of November and will remain idle for about two months.

On November 13 fire caused a loss of about \$3000 to the plant of the Tudor Boiler Mfg. Company, on East Second street, Cincinnati. The press reports as to the extent of the damage are somewhat exaggerated, as it was not sufficient to cause any material delay in shipments.

Henry R. Merton & Co., Ltd., London, England, in their circular giving the statistics of copper stocks in England and France, note a decline from 67,340 tons September 30 to 61,836 tons October 31. This is the heaviest reduction in any month for several years.

The National Association of Brass Manufacturers will hold its annual meeting at Hotel Astor, New York City, on Wednesday and Thursday, December 13 and 14. Commissioner William M. Webster, 64 Randolph street, Chicago, believes, from present indications, that it will be a well attended meeting.

Isthmian Canal Commission Bids

WASHINGTON, D. C., November 13, 1911.—Bids were opened by the Isthmian Canal Commission to-day to furnish material parts for snubbing posts and springs, anchors, etc., for buffers on the lock walls. There were 30 bidders as follows:

American Car & Foundry Company, New York: Class 1, \$8,597.76, 50 to 180. Class 2, \$6,257.02, 50 to 100 days. Class 3, \$19,206, unit 75 cents each, 50 to 100 days.

American Steel Foundries, Chicago: Class 3, \$128,040, \$5 each, 90 to 200 days.

W. Bingham Company, Cleveland, Ohio: Class 2, item 11, mild steel, galvanized, \$1,892, 90 days; black, \$1,628. Vanadium steel galvanized, \$2,442; black \$2,178.

Buffalo Foundry & Machine Company, Buffalo, N. Y.: Class 1, \$6,608.22, delivery not stated.

Crucible Steel Company of America, Pittsburgh, Pa.: Class 3, 90 to 365 days. Class A, \$41,484.96, \$1.62 each. Class B, \$54,288.96, \$2.12 each. Class C, \$83,226, \$3.25 each.

Farist Steel Company, Bridgeport, Conn.: Class 3, \$14,084.40, 30 to 90 days if shipped in bundles; \$15,364.80 if boxed.

Fawcous Machine Company, Pittsburgh, Pa.: Class 1, \$647.45, 45 to 100 days.

R. C. Hoffman & Co., Baltimore, Md.: Class 1, \$6,999.98, 40 to 65 days; if castings are painted, \$7,119.98.

Illinois Bolt, Nut & Forge Company, Chicago: Class 2, items 7 and 8, \$1,112.63.

Marshall Foundry Company, Pittsburgh, Pa.: Class 1, \$7783.56, 45 to 135 days.

Minneapolis Steel & Machinery Company, Minneapolis, Minn.: Class 1, \$7,039.69, 100 to 200 days. Class 2, \$7,458.12, 90 to 180 days.

New Jersey Foundry & Machine Company, New York: Class 1, \$5,725.43, 60 to 140 days. Class 2, \$6,712.83, 60 to 120 days.

Oliver Iron & Steel Company, Pittsburgh, Pa.: Class 2, all items except 10, 11 and 12, \$1,957.95, 60 to 90 days.

Pittsburgh Rivet Company, Pittsburgh, Pa.: Class 2, items 7, 8, 9, 13 and 14, \$2,134.64, 50 to 75 days.

Pittsburgh Screw & Bolt Company, Pittsburgh, Pa.: Items 7, 8, 9, 10, 11, 12, 13 and 14, \$2,051.65.

Power & Mining Machine Company, New York: Class 1, \$7,111.76, 56 to 112 days. Class 2, \$6,548.36, delivery not given.

Railway Steel Spring Company, New York: Class 3, item 15, regular bid, \$15,876.96. Four alternative bids, designs 1, 2, 3 and 4: 1, \$14,084.40; 2, \$13,572.24, unit 53; 3, \$13,316.16, unit 52; 4, \$13,828.32, unit 54, 30 to 185 days.

Richard Mfg. Company, Bloomsburg, Pa.: Class 1, \$8,070.48, 60 to 120 days. Class 2, \$8,612.78, 60 to 120 days. Class 3, alternative bid, \$23,047.20, 60 to 150 days, unit 90 cents.

Julian Richmond, New York: This bid was too complicated to be abstracted.

Rosedale Foundry & Machine Company, Pittsburgh, Pa.: Class 1, \$8,730.46, 60 to 120 days. Class 2, \$7,516.88, 60 to 120 days.

Ross-Meehan Foundry Company, Chattanooga, Tenn.: Class 1, \$6,875.59, 10 to 50 days.

Standard Foundry Company, Buffalo, N. Y.: Class 1, \$5,518.09, 60 to 150 days.

Sterritt, Thomas Company, Pittsburgh, Pa.: Class 1, \$6,328.88, 60 to 90 days.

Union Foundry & Machine Company, Pittsburgh, Pa.: Class 1, \$10,093.42, 60 to 120 days. Class 2, \$7,909.89, 60 to 80 days.

Union Spring & Mfg. Company, Pittsburgh, Pa. Regular, Class 3, \$14,084.40, unit 55, 25 to 40 days. Alternative, \$15,364.80, unit 60, 25 to 40 days.

United States Steel Products Company, New York: Class 3, alternative bid, \$15,620.88, unit 61.

Weatherly Foundry & Machine Company, Weatherly, Pa.: Class 1, \$6,516.71, 60 to 300 days.

Wheeling Mold & Foundry Company, Wheeling, W. Va.: Class 1, \$8,520, 30 to 60 days.

Lynchburg Foundry Company, Washington, D. C.: Class 1, \$7,381.18, 60 to 150 days.

Trenton Foundry & Machine Company, New York: Class 1, \$6,278.44, 45 to 90 days.

Three papers on autogenous and electric welding were presented before the New York meeting of the American Society of Mechanical Engineers, on the evening of November 14, at the Engineering Societies Building, New York City. Much new data were contributed and it is hoped later to present them in these pages. A noteworthy feature of the evening was the generous use of the lantern photograph, including motion pictures. The first paper was by H. R. Cobleigh, of the International Steam Pump Company, formerly mechanical editor of *The Iron Age*, dealing with the apparatus used in the different processes; the second, by G. E. Pelissier, superintendent of the Goldschmidt Thermit Company, and the third by C. B. Auel, assistant manager of works of the Westinghouse Electric & Mfg. Company.

The "Steel Wire Gauge"

The American Steel & Wire Company makes the following announcement of a decision concerning the wire gauge arrived at by a number of manufacturers and consumers in compliance with a suggestion from the Bureau of Standards:

The wire gauge for which sizes were shown heretofore in this company's publications, under the title of "American Steel & Wire Company's Gauge," was the same as the Washburn & Moen gauge, and also the same as that used by practically all of the steel wire manufacturers of the United States, under various names. It results from this fact that there is really a standard steel wire gauge in the United States, although this has not been formally recognized.

Upon the recommendation of the Bureau of Standards at Washington, a number of the principal wire manufacturers and important consumers have agreed that it would be well to designate this gauge as the "Steel Wire Gauge"; in cases where it becomes necessary to distinguish it from the British Standard Wire Gauge, it may be called the "United States Steel Wire Gauge." The name thus adopted has official sanction, although without legal effect.

The only wire gauge which has been recognized in Acts of Congress is the Birmingham gauge. The Treasury Department has for many years used this gauge in connection with importations of wire, and the adoption of succeeding tariff acts with provisions for the assessment of duty according to gauge numbers gives legislative sanction to the gauge. Until certain provisions of the tariff act are amended the Treasury Department probably cannot discontinue the use of the Birmingham gauge. It should, however, be abandoned by all other users, since the gauge itself is radically defective, and it is nearly obsolete, both in the United States and in Great Britain, where it originated.

For copper wires and wires of other metals the gauge universally recognized in the United States is the "American Wire Gauge," also known as the Brown & Sharpe. No confusion need arise between the Steel Wire Gauge and the American Wire Gauge, because the fields covered by the two gauges are distinct and definite.

The Steel Corporation's Unfilled Orders

The statement of unfilled orders of the United States Steel Corporation on October 31 given out for publication on Nov. 10, showed a total of 3,694,328 tons, as compared with 3,611,317 tons on Sept. 30, an increase of 83,011 tons. The statement of Sept. 30 showed a decrease of 84,668 tons from the total on the books August 31. The statements for the last days of June, July and August had all shown increases. Low point in the tonnage records of the Steel Corporation was touched at 2,674,757 tons on December 31, 1910. The amounts reported for the various months of this year are as below, in tons:

Oct. 31, 1911.....	3,694,328	May 31, 1911.....	3,113,187
Sept. 30, 1911.....	3,611,317	April 30, 1911.....	3,218,704
Aug. 31, 1911.....	3,695,985	Mar. 31, 1911.....	3,447,301
July 31, 1911.....	3,584,085	Feb. 28, 1911.....	3,400,543
June 30, 1911.....	3,361,058	Jan. 31, 1911.....	3,110,919

It will be seen that the increase in unfilled orders in October practically brings the total back to what it was at the close of August. The totals at the close of the various years have been as follows: 1902, \$5,347,523 tons; 1903, 3,215,123 tons; 1904, 4,696,203 tons; 1905, 7,605,086 tons; 1906, 8,498,719 tons (the high record); 1907, 4,624,552 tons; 1908, 3,603,527 tons; 1909, 5,927,031 tons.

The Commerce Court has granted a temporary injunction against the order of the Interstate Commerce Commission in the long and short haul cases, known as the Intermountain cases. While agreeing with the commission that the fourth section (long and short haul) is constitutional, the Commerce Court holds that the commission has no right to make blanket rates, nor to make rates on percentages, and, therefore, no right to establish zones in which one rate is a percentage of another.

The No. 2 Crane furnace of the Empire Steel & Iron Company at Catsauqua, Pa., was blown out for relining November 13 and will be idle for about two months. In October the furnace made a record with an output of 8386 tons of foundry iron, or a daily average of over 270 tons.

Personal

A. P. Scott, who for the past three years has been connected with the Allegheny Steel Company, Pittsburgh and Brackenridge, Pa., as metallurgist, has just resigned that position and goes to the Dominion Iron & Steel Company, Sydney, Nova Scotia, in the same capacity, his duties in the latter place to begin December 1, 1911. On the evening of Saturday, November 11, Mr. and Mrs. Scott were entertained by the officials of the Allegheny Steel Company and their wives at a farewell dinner at the Fort Pitt Hotel.

Harry W. Frister, who has been associated with Rogers, Brown & Co., New York, has resigned to take a similar position with the Pyrene Fire Extinguisher Company, New York.

R. A. Wilson, formerly with the Snow Steam Pump Works, Buffalo, N. Y., has been appointed gas expert for the Carnegie Steel Company at Youngstown, Ohio.

A. M. Welch, for about eight years with the Studebaker Company and for the past year manager of the commercial car department of the Franklin Works at Syracuse, N. Y., has now taken up territorial work with the Stevens-Duryea Company, Chicopee Falls, Mass.

F. A. Deichen, a machine tool builder of Berlin, who had been in this country for five weeks, sailed on Tuesday for the other side of the Atlantic.

Paul Vogel, of the machinery house of Alfred H. Schutte, 90 West street, New York, sailed for Europe on Tuesday.

Carl Humperdinck, of the Badische Maschinenfabrik & Eisengiesserei, Durlach, Germany, and G. E. Niemczik, of Gans & Co., Budapest, Austria-Hungary, who have for some time been studying American methods at numerous foundries, return home this week.

O. D. Hogue has been appointed vice-president and treasurer of the Goulds Mfg. Company, of Illinois.

W. J. Brand, Empire Building, Pittsburgh, dealer in foundry supplies, has been elected treasurer of the Pittsburgh Foundrymen's Association, succeeding John McLaren, deceased.

Peter Donaldson, of James Watson & Co., Glasgow, Scotland, arrived in New York this week on business connected with the Dayton Coal & Iron Company, Ltd., Dayton, Tenn., of which he is president.

P. D. McLaren, P. O. Box 1835, Calgary, Canada, has severed his connection with the Canadian Fairbanks-Morse Company and has established himself in that city as a manufacturer's agent.

J. C. Ward, resident director and general manager of the Edgar-Allen Company, Ltd., Chicago, has just returned from a trip around the world taking about nine months, in the course of which he visited all of the agencies of the company.

Otto Faulenbach, representing the well known iron mining and selling firm of W. H. Mueller & Co., The Hague, Holland, is now in the United States.

Obituary

August Marx

August Marx, general manager of the Philadelphia Roll & Machine Company, died November 6 at his home in Philadelphia, Pa., aged 54 years. He had been in poor health for some time but his death was unexpected. He was born at Bad Homburg, Germany, and left home at the age of 13 as cabin boy on a sailing vessel. After three years of that experience he landed in New York, whence he drifted to Philadelphia where he made his home. In 1880 he became connected with the Lombard & South Streets Passenger Railway Company, where his ability resulted in his advancement to superintendent of the Passyunk Division of that system. On consolidation of that company with the Frankford & Southwark Company in 1891, he resigned his position and toured the Continent. In 1892 he became connected with William Wharton, Jr., & Co., Inc., assuming the superintendence of materials for the construction of the Third Avenue Railroad Company,

New York City. At the time of the formation in 1895 of the Philadelphia Roll & Machine Company, a subsidiary of the Wharton Company, he severed his connection with the parent company and joined the new one, and his unusual business ability and qualifications, coupled with his able leadership and exceptional capabilities for organization, soon won for him the active management of affairs, holding the position of general manager until his death.

Mr. Marx was a self-made man in every sense of the term, whose business life exemplified the Golden Rule, and who applied to an extraordinary degree the principles of integrity to all his transactions. He was interested in the Hebrew Charities as well as prominently connected with a number of building and social societies. He leaves a widow, a daughter and a son, Joseph Marx.

C. L. RICE, a pioneer in the mill supply business and one of the oldest members of the Dodge selling family, is dead. According to the Chicago branch of the Dodge Mfg. Company, where Mr. Rice was identified, he was crossing a down-town street at noon on November 2, when a team of draft horses knocked him down. Picked up in an unconscious condition, he was hurried by ambulance to a Chicago hospital, where examination by physicians showed only several severe bruises on the face and head and no internal injuries. He failed rapidly, however, and passed away November 3, without regaining consciousness. He was 89 years old, and had been more or less connected with the Dodge people since the introduction of the wood split pulley 40 years ago. Engaged then in the general machinery business and carrying about the only stock of wood and iron working machinery in Chicago, under the name of Rice Machinery Company, he took the first agency for the sale of Dodge Independence wood split pulleys.

ALBERT BENTON REEVES, Columbus, Ind., one of the founders of Reeves & Co., agricultural implement makers, died November 5, aged 72 years. He had gone to a local hospital to undergo an operation. He was born in Rush County, Ind., and was a farmer until he invented a plow. The manufacture of this plow was begun in Columbus 35 years ago, and the business grew until it has become one of the largest agricultural and threshing machinery interests in the Middle West.

JOHN MCMURDIE WARNER, Philadelphia, Pa., died suddenly November 11 from heart disease, aged 53 years. He was a member of the old pig-iron firm of Rogers, Brown & Warner, retiring from business about eight years ago. He had since then traveled extensively and became the possessor of a famous art collection. He was a member of many historical organizations. He was born in Chillicothe, Ohio. He leaves a widow.

EDWARD POHL, formerly president of the Pohl Iron Works, Louisville, Ky., died in that city last week at the age of 75 years. He retired from business several years ago. He was born in Austria, and had made his home in Louisville for 50 years.

CHARLES REA, Pittsburgh, Pa., one of the founders of Robinson, Rea & Co., builders of rolling mill machinery, whose business was some years ago taken over by the Mesta Machine Company, died November 9, aged 88 years.

The new Court of Commerce on November 9 granted the prayer of transcontinental railroad companies for injunctions in the important intermountain rate cases. The injunctions will hold up the recent decisions in the Spokane and other cases regarding railroad rates. The order under consideration established rate zones for the benefit of interior towns west of the Missouri River, which heretofore have been charged the full rate to the Pacific coast, plus the local haul back. Complaint was brought under the long and short haul clause by Reno and other towns, intermediate points in Nevada, Arizona, Utah, Washington and California being affected. The order was to have gone into effect November 15.

The Ingersoll-Rand Company, 11 Broadway, New York, authorizes the statement that it has purchased the rights to manufacture the line of drills formerly built by the J. George Leyman Engine Company, Denver, Col. The plant of the Denver company, which made drills for rock, mining and tunnel work, was not acquired.

Pittsburgh and Vicinity Industrial Notes

Francis V. Kemble of New York City, who bought the property of the Vulcan Foundry & Machine Company at New Castle, Pa., at sheriff's sale, has sold it to the Adrian Realty Company, a New York corporation, for \$46,084.98. The Adrian Realty Company is composed of persons largely interested in the Buffalo, Rochester & Pittsburgh Railroad. What disposition will ultimately be made of the plant is not known at this time.

The Standard Steel Car Company recently shipped from its works at New Castle, Pa., 11 passenger cars designed and built especially for the Boston Subway. The cars are of all-steel construction, extra length, and equipped with the most modern electric appliances and motors.

The Pittsburgh Armature Works, West End, Pittsburgh, manufacturer of armatures, coils and commutators and making a specialty of electrical repairs, has purchased a plot of ground, 60 x 150 ft., on which it will erect a two-story steel and concrete building. Ground will be broken in the spring, and it is expected that the building will be ready for occupancy by August 1. The first floor will be used for storage and for making repairs to automobiles, which is a new departure, while the second will be devoted to the company's present business. J. J. Kossler is manager.

The Pennsylvania Tank Car Company, Pittsburgh, recently incorporated, will build a plant on the property of the Petroleum Iron Works Company, adjoining its plant at Sharon, Pa. The company will manufacture tank cars and repair old cars. G. F. Woodsmith is president and general manager, and work has been started on the construction of 1700 ft. of switches for storing cars.

A Mallet simplex locomotive, the largest mogul ever built, now being tested by the Pennsylvania Railroad on the mountain grades, performed the remarkable feat on November 3 of pushing 46 loaded cars up the grade of the Alleghenies between Cresson and Gallitzin. The engine in front, for the purpose of the test, did not pull a pound, the power being cut off. The Mallet performed the work of two of the most powerful locomotives in service.

The Jamison Coal & Coke Company, Pittsburgh, reports that its shipments of foundry coke in October were 969 cars, aggregating about 25,000 tons, showing an increase over September of about 7,500 tons.

The Pittsburgh office of the Babcock & Wilcox Company, Farmers' Bank Building, has received an order from the Pittsburgh Crucible Steel Company for 8000 h.p. horizontal water-tube boilers of the Stirling and Rust types, to be installed in the new open-hearth steel plant at Midland, Pa. The design of stoker with which these boilers will be equipped has not yet been settled. The Babcock & Wilcox Company has also received orders from the Consolidation Coal & Coke Company, Fairmont, W. Va., for 2500 h.p. Rust water-tube boilers; American Sheet & Tin Plate Company, for 1500 Stirling horizontal water-tube boilers for delivery at Cleveland, Ohio, Gary, Ind., Scottsdale, Pa., and Canton, Ohio; H. C. Frick Coke Company, Pittsburgh, for 500 h.p. Stirling boilers; Standard Oil Company, Cleveland, Ohio, for 700 h.p. Stirling boilers and Keystone Coal & Coke Company, Pittsburgh, for 500 h.p. Stirling boilers.

At a meeting of directors of the Oil Well Supply Company, Pittsburgh, held November 6, Louis Brown was elected president, to succeed John Eaton, deceased; L. C. Sands, vice-president; Grant Hubley, secretary; D. J. Brown, treasurer. W. H. Spain was added to the board of directors.

The Bessemer & Lake Erie Railroad, owned and operated by the Carnegie Steel Company, has made a new traffic record in the past three months, hauling upward of 3,000,000 gross tons of ore, namely, 1,500,000 tons in August, 1,000,000 tons in September, and 950,000 tons in October.

The Westinghouse Electric & Mfg. Company, East Pittsburgh, has received as sub-contractor, through the John W. Danforth Company, Buffalo, N. Y., an order from the Navy Department for additional electrical equipment for the central power plant at the Mare Island Navy Yard, San Francisco, comprising six induction motors with a double equipment of 142½ h.p., both single and double speed motors, for driving circulating and condensing

pumps; three 50 Kva. transformers for reducing the voltage of the generators, one 20 kw. motor-driven exciter set, two 25 kw. turbo-generator exciter sets, one 13 panel station switchboard, and one distributing panel. The generating equipment for this station was purchased some time ago and includes one Westinghouse-Parsons 1000 kw. 2200 volt turbo-generator.

Frank B. Ward, dealer in machinery, machine tools and foundry, mill and shop equipment, has removed from the Machesney Building to 1401-1402 Park Building, Pittsburgh. He represents in the Pittsburgh district Henry Pels & Co., of New York and Berlin, the Central Machine & Foundry Company, Marion, Ind., and other machine tool makers, and in connection with F. B. Hurlbut will hereafter look after the interests of the Cleveland Crane & Engineering Company in Wickliffe, Ohio, in the Pittsburgh district.

The Riter-Conley Mfg. Company, Pittsburgh, has received a contract for the building of a gas holder for Detroit, Mich., to take 2700 tons of plates, which will be rolled by the Carnegie Steel Company.

Tate, Jones & Co., Inc., Empire Building, Pittsburgh, report that orders for their heat treating furnaces are increasing. Contracts were recently received for these furnaces from the Autocar Company, Ardmore, Pa.; Alloy Steel Forging Company, New York City; Carnegie Technical Schools, Pittsburgh; Chalmers Motor Company, Detroit, Mich.; Mason-Seamon Transportation Company, New York City; Remington Arms Company, Ilion, N. Y.; Monarch Metal Mfg. Company, Kansas City, Mo.; B. C. Ames Company, Waltham, Mass.; Windsor Machine Company, Windsor, Vt.

The Best Mfg. Company, Pittsburgh, maker of valve fittings, etc., has appointed Charles E. Hague as its Philadelphia representative with headquarters in room 1510 Land Title Building. He will have charge of eastern Pennsylvania, Baltimore and Washington. It has also appointed C. L. Stickney & Co. as its representative in Washington and Oregon, with headquarters at 108 White building, Seattle.

The Fort Pitt Spring & Mfg. Company, McKees Rocks, Pittsburgh, in addition to making coil and elliptic springs, including vanadium steel springs, will manufacture all forms of bars for concrete reinforcing. It has appointed the Fitzhugh-Luther Company, Monadnock Block, Chicago, Ill., its Western sales representative.

Through the efforts of the Board of Trade and the Petroleum Iron Works Company, Sharon, Pa., the Pennsylvania Tank Car Company, recently organized with a capital stock of \$50,000, will build a plant in Sharon for the manufacture and repair of tank cars. Its capacity will be the manufacture of 100 cars per month and the repair of a similar number. G. F. Woodsmith is president and general manager of the company.

The Standard Steel Tank & Mfg. Company, Pittsburgh, which recently took over the plant formerly operated by the McAllister & Byrne Construction Company at Girard, Ohio, is making a line of pneumatic pressure tanks, air receivers, freezing tanks for ice plants, oil storage tanks, etc. James T. McLaughlin, Cleveland, Ohio, is president; F. M. Stricker is vice-president and general manager, and Joseph L. Kountz, formerly president of the Columbia Steel & Shafting Company, Pittsburgh, is secretary and treasurer, and has charge of the offices in the Oliver Building, Pittsburgh. The company is rearranging its power system from steam to motor drive and is taking estimates on new equipment, including an oxy-acetylene welding plant, a 14-ft. gap riveter, etc.

Reports that Max Solomon, Oliver Building, Pittsburgh, who recently purchased the plant of the Shenango Iron & Steel Company at Wheatland, Pa., would equip it for the manufacture of wrought iron pipe are untrue. He has not yet decided what he will do with it.

The Youngstown Sheet & Tube Company, Youngstown, Ohio, has placed a contract with the William Tod Company of that city for a blooming mill and blooming mill tables. The pinions will be 44 in. and the size of the rolls 36 x 92 in. The company first named has also placed a contract for a 44 in. and 76 in. x 60 in. twin tandem compound engine with the Mesta Machine Company, Pittsburgh. These contracts, with spares for engine and mill, will amount to over \$200,000 and call for deliveries by July 1, 1912.

Standardizing Factory Expense and Cost

It Largely Eliminates Chance Variations and Aids in Locating Those Due to Carelessness or to Increased Efficiency

BY STERLING H. BUNNELL.

Too much attention is concentrated by men interested in cost keeping, on the building up and distributing of an expense account by some system which shall dispose of it in the easiest possible way for the bookkeeping department. Expense burden is an element in factory accounting, which occupies a place similar to the surplus reserved against future lean periods. An organization which divides up its profits each month to the last cent, retaining nothing for a surplus, would soon be in a bad way. The surplus account is comparable to what engineers term stored energy; it acts like a storage battery on an electric service system, taking up the excess of one interval to give it back when required at another. No wise stockholder objects because the dividends are maintained at a uniform figure year after year and the fluctuations of net income turned into the surplus account. But the same man looking at the cost accounts of the factory generally believes that fluctuations of cost due to temporary conditions of factory operation, are indications of correct cost-keeping.

Cost and Expenditure in a Given Period

The idea is very commonly held among manufacturers, that the cost of manufactured product in a given period is the sum of expenditures of the factory in that period. Although the fallacy of this belief is apparent to most men upon consideration, there are yet some manufacturers and bookkeepers who insist upon their belief in the truth of the principle as stated. If the rule were rigidly applied, the payment of a power service bill in May rather than April would increase the cost of goods in May and decrease the cost in April. If the bill was one of a monthly series, almost any bookkeeper would enter it in the account of the month in which the service was rendered, whether paid then or later. He would, however, question whether a bill paid in the month of May, for repairs to a machine which broke down on the 29th of April, should go to increase the cost of goods turned out in April or in May.

The fact is that the items which go to make up the cost of a manufactured product often have little to do with times and seasons. Machines break indiscriminately in any month of the year, and are repaired at once or later as is most convenient. Coal bills are larger in winter than in summer, yet no greater amount of factory product is turned out to correspond to the increased fuel cost. Even the payroll is subject to seasonable fluctuations caused by snow shoveling in winter, cleaning the yard in spring, and occasional rearrangement of materials in storage. It is true, in many cases, that the fluctuations in one account balance those in another, so that the well run factory shows a uniformity in expense burden, which with uniformity in direct cost presents a very attractive appearance of efficiency. There is nothing more deceptive than such a condition. Where costs of similar parts happen to come out alike, for successive lots, due to the fact that gross irregularities are checked off against each other, the only effect of cost-keeping is to hide and cover up errors of the management.

Relation of Stored Energy to Indirect Expense

A well managed factory presents a striking instance of stored energy in the organization as well as in the moving machines. In the projection of the factory, a considerable amount of money becomes "latent," as it were, in the form of organization expenses. For the first few months of operation, expenses are sure to exceed income. Gradually a smooth-working force of men is brought together, a routine becomes established and the product begins to come out of the works at a rate which approaches the expected normal. By this time the factory organization has become a "going concern." Like all moving objects, it has stored a quantity of energy by virtue of which it

will continue to operate smoothly unless the organization is seriously disturbed. The factory is worth more money as a going concern than it would be as an idle, closed shop, even though the equipment in each case were the same.

Of the two general divisions of factory cost, direct and indirect, the latter is the one in which the cost of the stored energy is principally located. In this account are carried the salaries of the management, the engineering force, the clerical department and the foremen; the cost of power, and the cost of depreciation, taxes, insurance and repairs, all of which are expenses by virtue of which the organization is kept together and in running order. An insurance premium is paid covering a term of one or more years to come, and the accountant immediately divides the premium into portions, one for each month of the term of the policy, thus equalizing the expense of insurance over the coming months. Interest on the capital invested in the plant is similarly arranged in monthly installments. Salaries are handled uniformly in the same way. It would appear to require no wrench of the imagination to apply the same sensible plan to the other items of expense, depreciation, repairs, cost of power, general labor and the rest.

The Handling of Depreciation

Depreciation is computed in either of two ways, as a uniform percentage on the original cost of the equipment, or as a uniform percentage on the decreasing value of the equipment. In the first case, the reserve for depreciation is built up like a sinking fund by uniform payments, so that at the end of the life of the equipment a fund is at hand with which to replace it. In the second case, the annual charge for depreciation decreases year by year. The theory advanced for depreciating on the decreasing balance is that the concern is better able to stand a large reduction for depreciation in the early years than later, when the tools are becoming old. There is little of good logic in this argument. Quite as many organizations could stand a large loss better in later years than when they are new and without established strength. Further, the equipment does not wear out all at once, even though purchased at the same time. When one item is ready for the scrap heap, another may yet have a long period of usefulness, and any attempt to arrange depreciation rates so as to reduce the book assets down to the exact scrap heap value of each machine is based on little else than pure guesswork.

Other items of the expense account are governed by no fixed rules. Repairs to machinery occur on one or the other of the machines by chance. Of the machines running in a large factory, some will operate for years without repairs; others will break down early in their career, and give good service for long years after repairs are made. Repair cost is likely to fluctuate accordingly, through a wide range. The cost of heat and light has a periodical rise and fall, due to the seasons. More coal is burned in winter than in summer, and the expense account varies accordingly. All these fluctuations are by many manufacturers thrown directly into the cost of product. If the detailed costs are comparatively uniform from month to month, it is merely because one variation cancels another.

The manager of a factory is accordingly not justified in satisfaction with every slight reduction in the expense account, the result of one or more causes unknown. If department B has made a saving, that department should receive the credit; while if department A has wasted money, its fault should not be concealed by the superior virtue of department B. It is not necessarily a mark of good management to increase the repair force in the summer because at that time power cost is low and the total expense account will not be raised by the increase in wages. With limited financial resources it may be neces-

sary to suit the schedule to the funds available; but this may be done at the expense of operating requirements. The equalization of burden from period to period, or the variation of burden, to keep it in uniform ratio to the value of product, is rather an accounting proposition than a matter of good shop management. The desired result is better obtained by accounting methods, with the aid and advice of the construction department, than by distorting the shop operating schedule with the advice of the financial head.

Value of a Standardized Expense Account

In these days of standardization of work there is nothing revolutionary in the suggestion that shop expense be standardized as well. There is no virtue in throwing fluctuations in the expense account into costs. A man could enter into a contract to insure his neighbor's barn, carrying the insurance himself, and this would be nothing more than betting. A corporation can enter into contracts to insure buildings over a wide area of country, and the transactions form a legitimate business operation. In the factory, it is impossible to foretell how many days will be spent for repairs on a given 16-in. lathe, but it is not particularly difficult to estimate the total amount that may be expected to be spent for repairs for all the machines together for a year. The same arrangement can be made for the cost of power, and for all the other details of the factory burden.

The broad conception of standardized expense burden is that the factory production is a task for the factory management, just as the machining of a piece of steel is a task for a workman. The manager undertakes to operate his factory with a certain force of men, supervised by certain foremen at expected salaries, and at a cost for repairs, power, supplies and all the rest, of a reasonable and known amount. A schedule can be prepared covering the details of expense of the factory. This schedule forms the basis of the expense burden distribution. Each scheduled expense is to be credited on the books to an account on the debit side of which appear the items actually expended for the account in question. The balance in each of these expense accounts then forms a definite measure of the performance of the person or department in whose charge this detail of the expense burden is placed. The total burden of the factory is uniform from month to month, subject only to variation in accordance with definite conditions which warrant a change.

The control which a standardized expense account gives over the operation of the factory is a powerful instrument in the hands of the management. In the power plant operation, for instance, the annual expense for power is determined from records and data, and an expense account entitled "Power Plant" is opened. This account is debited with the wages of engineers and firemen, with the cost of fuel and supplies, repairs, depreciation and interest on the capital value of the power plant, the latter in monthly installments. If the cost of power increases, the effect is at once shown by the debit balance in the account. If it decreases, a credit balance appears. The conditions underlying any considerable balance can be investigated whenever the balance is observed, and the work of the chief engineer compared with the balance accordingly.

The same principle can be applied to all the details of the expense account. The cost of repairs to small tools in a machine shop, of wages paid to laborers, and other expenses which are likely to fluctuate may be controlled to advantage if constantly compared with a definite schedule. Depreciation and repairs in particular are usefully handled in this way. The depreciation loss is arranged for in equal monthly installments building up a sinking fund from which renewals to machinery can be made as required. Some tools will unexpectedly become obsolete in five years, while others will far outlast their expected lives. The standardized depreciation account takes care of these various conditions by balancing one against another. Repairs may vary from month to month, but the variations spread over a term of years tell the truthful story of conditions. Three machines may break in the same month, but this is rarely an indication that the goods made in that month cost more than in the next month when no breakage occurs. A lower repair cost in a given month occurs because the plant has borrowed from the past or from the future; sooner or later, the difference will be equalized by a swing of the pendulum the other way.

Causes of Increased Cost Located

A uniform burden, distributed by uniform methods to the manufactured product, provides a condition by which chance variation in cost of product is largely eliminated. It is rarely possible to sell one article at a higher price than the same article made at another time, to cover a difference in cost. Selling prices are made by lists and remain more or less uniform. Variation in cost tells a salesman little or nothing; it may, however, tell the manager very much. With a uniform burden, an increase in factory cost of a given item is caused by nothing else but an increase in labor or material. It is impossible to hide such a condition, or to pass it by with the suggestion that an extra bill or two was paid during the past month and the burden increased accordingly.

Uniformity can be secured only by working to definite standards. Thousands of parts are made closely alike by comparison with standard gauges and jigs. Costs of the same parts may be made closely alike by the application of standard efficiency, standardized operating plans and uniform payments for the work. It only remains to control the operation of each department and detail of the factory, by gauging its efficiency against a standard expense account, definitely detailed and scheduled, so that variations due either to carelessness or to increased efficiency may be recognized and dealt with accordingly.

Lake Iron Ore Shipments in October

The comparison between October shipments of Lake Superior ores this year and those of October, 1910, is closer than for any other month of the season, the October total being 4,769,965 gross tons, or 107,476 tons less than for October of last year. The total to November 1 this year was 29,607,102 tons, against 39,978,308 tons to November 1, 1910, or a falling off of 10,371,206 tons. The shipments by ports for the two years in gross tons were as follows:

	Oct., 1911.	Oct., 1910.	—To Nov. 1—	
			1911.	1910.
Escanaba	677,807	639,444	3,764,654	4,507,517
Marquette	387,436	309,283	1,956,147	2,998,503
Ashland	381,595	380,839	2,260,381	3,817,669
Superior	1,368,893	1,317,902	9,315,002	7,802,254
Duluth	956,342	1,223,710	6,457,706	13,089,262
Two Harbors	997,892	1,006,263	5,853,212	7,763,103
Total	4,769,965	4,877,441	29,607,102	39,978,308
1911 decrease	107,476		10,371,206	

Water shipments for the season of 1910 were 42,611,191 tons. They will probably fall about 11,000,000 tons short this year.

Alliance Crane Contracts.—The Alliance Machine Company, Alliance, Ohio, last week closed crane contracts as follows: Seven for the Youngstown Sheet & Tube Company, covering one 60-ton, one 40-ton, one 25-ton, one 15-ton, three 10-ton; two 150-ton four girder ladle, one 75-ton four girder ladle, one 40-ton special revolving trolley forge, and one 25-ton mixer trolley for the Pittsburgh Crucible Steel Company. In addition to the above, orders recently taken by the company include a 25-ton, Harlan & Hollingsworth Corporation; 10-ton, Canton Sheet Steel Company; 150-ton stripper, Nova Scotia Steel & Coal Company; 5-ton crane, Inland Steel Company; 5-ton, Portsmouth Steel Company; 5-ton wall, Pennsylvania Steel Company; 5-ton, Wright Wire Company; 10-ton, Carnegie Steel Company; one 10-ton and two 5-ton, Republic Rubber Company; one 30-ton and one 5-ton, Scullin-Gallagher Iron & Steel Company; 6-ton, Pittsburgh Plate Glass Company; 10-ton, National Tube Company. Shipments made in November covered a wide range of customers and localities among them having been the following: A 75-ton four-girder ladle crane, National Tube Company, Lorain Works; floor type Bessemer charging machine, Dominion Iron & Steel Company; two 10-ton coke hoists, Tennessee Coal, Iron & Railroad Company; 24-in. I-beam shear, Eastern Steel Company; 50-ton four-girder ladle crane and a 10-ton crane, National Malleable Castings Company; gantry bucket crane, Delaware, Lackawanna & Western Railroad; 15-ton crane, Inland Steel Company; seven 5-ton cranes, Gary Screw & Bolt Company; five 6-ton jib cranes, Indiana Steel Company; one I-beam hoist, American Conduit Mfg. Company.

An Analysis of Factory Work

The Problem Created by the Increase in Enervating Tasks and the Decrease in Those That Energize

At a dinner of the Chicago Commercial Club at the Blackstone Hotel, Chicago, Saturday evening, November 11, Dean Herman Schneider, of the University of Cincinnati, gave an address on "An Analysis of Work," in which some very interesting propositions were developed. During the past five years, under Dean Schneider, a course of co-operative industrial education has been followed at Cincinnati, the unique feature of which is (as heretofore explained in these columns) that during alternate weeks students are in the classroom and in the shops of the various manufacturing concerns in Cincinnati, the shop work being laid out for them by the directors in the same manner as the balance of the curriculum. Contemporaneous with the development of this course, an opportunity has been presented to Dean Schneider for an investigation of the psychological effect of various kinds of work upon the operator. Some classes of work, it has been found, tend to the stunting of the mind, while other forms energize the thinking faculties.

If the processes of industry and the mechanical operations they involved provided within themselves reactions from the routine of various kinds, they would, as did the old time guild system, develop the workman's mentality as well as his manual skill. On the contrary, division of labor and automatic operations have so greatly increased that many of the conditions and a large proportion of the work now done in mill and shop tend directly to mental retrogression. It becomes, therefore, distinctly an educational work to supply and direct counteracting influences. To establish the correct premise upon which to base a prescription for these ills, an analysis of work has been made. The cure is not intended simply to better manufacturing conditions as an ultimate end, but by modifications in industrial operations to contribute to the betterment of the civic community. Concerning this analysis, Dean Schneider spoke, in part, as follows:

Changes in Conditions of Work

In the first place, it is only within the past two generations that mankind has worked in masses within walls. For centuries men did individual, self-directed work almost entirely in the open. The change has come, of course, through the development of power devices, and dates from the invention of the steam engine.

In the second place, the industrial worker formerly knew a whole job, rather than a part of it; he performed a great variety of functions in the completion of his task, instead of endlessly repeating the same operation. The clockmaker made a whole clock, working individually, and the necessity of working out every part's relation to every other part gave the worker a mental stimulus and therefore a higher mental development. The finished product was all his own; the desire for self-expression which every man has found an outlet through his work; and once having served thorough apprenticeship he worked largely by self-direction. Under our present highly organized industrial conditions, the making of a clock is subdivided into a large number of operations. Each workman in a clock factory makes piece after piece of the same kind, principally by feeding material into a machine, and why he does it he need not know, and usually is not told. We are putting the brains into the machine and into the management office, and making the workman a purely automatic adjunct. It is unquestionable that much of the present spirit of industrial unrest is Nature's protest against work without light, physical and mental.

The Great Drawback of Automatic Work

It is this purely automatic, high-pressure work in closely crowded rooms which is the most ominous feature of modern industrialism, its most serious aspect being the effect upon the mental development. Scientific research has shown us that the monotonous rhythmic repetitions

of the machine's motion and the monotonous rhythmic motion of feeding the machine produce a hypnotic, deadening influence on the mind. The lower brain centers, controlling habits, are developed at the expense of the higher thinking centers. As the habit becomes ingrained, the worker becomes more lethargic and automatic, and almost as incapable of independent, intelligent action as the machine itself. Research further shows that the higher centers in the brain of such a worker are in danger of getting into a permanent, inelastic, hopeless set, if a lively stimulus is not supplied.

Further, there is in every individual a desire for self-expression, and if this cannot be had in one's daily work Nature will force an outlet for it. It cannot be dammed up very long; and since there is no outlet in the worker's daily task, it must come during his idle hours, and sometimes takes a form which leads to many of our most vexing sociological problems.

Enervating vs. Energizing Work

The situation, then, sifts down to this: Energizing work is decreasing; enervating work is increasing. In spite of the warnings of history, we are rapidly dividing mankind into a staff of mental workers and an army of purely physical workers. The physical workers are becoming more and more automatic, with the sure result that their minds are becoming more and more lethargic. The work itself is not character-building; on the contrary, it is repressive, and when self-expression comes it is hardly energizing mentally. The real menace lies in the fact that in a self-governing industrial community the minds of the majority are in danger of becoming atrophied, or at best of becoming trifling and superficial, because of lack of continuous exercise in conjunction with the earning of a livelihood. The kind of citizenship that a republic needs cannot be built on sixty hours per week of automatic work. But we cannot reverse our present economic order of things. Automatic work is increasing and will continue to increase for a long time to come. The condition is here and philosophical discussion will not remove it.

It is evident then that the law of physical labor must be divided into two laws, namely, the law of energizing work, which makes for progress, and the law of enervating work, which makes for retrogression. Nearly all the work still done in the open air, where there is a dependent sequence of operation, involving planning on the part of the worker, is energizing work. Specific examples may be cited in farm work, railroad work and the building trades. Certain work done indoors, under good conditions of light and air, is also energizing; for example, the work of a tool-maker, a locomotive assembler and a cabinet maker. The enervating work has come through the subdivision of labor in factories, so that each worker does one thing over and over in the smallest number of cubic feet of space. This type is recognizable at once in the routine of the garment worker, the punch press operator, the paper box maker, the shoe worker, etc.

Factory Town Morals

Aside from the broader factors, such as climatic conditions and racial characteristics, it is safe to say that the morals of a community depend upon the kind of work it does. A rural community of about twelve thousand people, having clean political conditions, a high moral tone, few jarring families, well kept gardens and a good average of intelligence, is a desirable place from the manufacturer's viewpoint in which to locate a factory. If a manufacturer locates in such a place and employs three thousand of the men, women and children in purely automatic, noisy, high-speed work, the town will change very materially in one generation. Its politics will become corrupt and its morals lax; its citizenship will lose its former mental stability and fly eagerly and earnestly from one

spectacular "ism" to another; its families will be on nervous edge, with family discipline gone; its yards and houses will lose their tidiness; saloons will increase. In a word, it will become "a factory town." And what was once a good community, with a high community efficiency, and therefore a safe place in which to invest money, becomes a town of low community efficiency and a constant menace to the industry itself. Every detail of the town's life is affected. Religion lags, while the amusement parks thrive on Sunday; for since the week-day work is repressive, an outlet for pronounced self-expression is demanded in the idle hour. Or, to put it in another way, Nature goes on the defensive. The slowly upbuilt appreciation of the fine arts is quickly destroyed, for this cannot grow without harmony, orderly thought and the desire to express ideals. Respect for law diminishes, for the law is put in the same class as an electrically wired strike fence. These significant changes are not the fault of the people who work; they are logical, natural products of the work itself.

The Grading of Energizing Work

For the purpose of analyzing work, a scale has been devised, in which the most energizing work is at the 100 per cent. point, and the most enervating at the zero point. The 100 per cent. work is that of the locomotive engineer. This has been selected because his work has the following elements:

- (a) It is done in the open air.
- (b) It provides a well-rounded physical development.
- (c) The constant improvements in locomotive design and in railroad appliances require continuous mental development.
- (d) Mental alertness is constantly required for emergencies.
- (e) A comprehensive grasp of the whole interdependent scheme of production (a railroad produces transportation) is essential.
- (f) The conditions under which the same run is made are never alike.
- (g) The work itself—not lectures or preachments or popular acclaim—breeds in the engineer the highest quality of good citizenship, namely, an instant willingness to sacrifice himself for the lives in the train behind him.

The zero point on the scale, or the most enervating work, is the work of a girl in her formative years in a steam laundry, when the following elements prevail:

- (a) Supersaturated, vitiated air.
- (b) Standing in a strained position.
- (c) The work consisting of feeding one piece after another of the same kind at high speed into a machine.
- (d) The hours of work being so long that fatigue poisons accumulate in the blood.

The scale is crude and lacks scientific accuracy. A statement, for example, that the work of a laster in a shoe factory is 40 per cent. energizing would be a guess. But the purpose of the scale is not so much to arrive at a percentage as to establish some standard of actual work for the purpose of diagnosis and treatment. Three investigators, analyzing the work of a laster, might classify it as 30 per cent., 40 per cent. and 50 per cent. energizing. The difference in their classifications would lead to a closer analysis and hence to a surer treatment.

The Contrast of Two Shops

To take a specific analysis, consider two adjoining weave sheds of a silk mill. Going first to mill A; you find a long room with an aisle down the center, on each side of which are the machines. Between the machines there is ample space for the operative (nearly always a girl) to go up and down tying the broken threads. In the main aisle and adjacent to each machine is a chair. When the girl has finished one round of her machines, she rests for a short period of time, and in this way fatigue is prevented. The two girls of adjoining machines usually time their rounds so that their rests come simultaneously. The noise in the mill is so slight that they can converse without any effort. The light is good, the air is not vitiated, the rest periods are sufficient and there is no nervous tension from noise or speed. The work is not monotonously automatic, the position of the body is not strained; but, on the contrary, many muscles are lightly brought into play. However, the work itself does not stimulate any mental activity nor develop any of the

finer and higher mental qualities. It can be classed as about 70 per cent. energizing.

The silk after leaving this mill is sent to mill B, where a number of strands are woven into a single strong strand. Since the silk is strengthened, the machine can be run at a higher speed. On entering mill B you are confronted with a noise so great that talking is entirely out of the question. The layout at mill B is precisely the same as at mill A, except that there are no chairs in the aisle. There are no rests between the rounds which the operator makes of the machines, since the speed does not permit. Talking is utterly impossible because of the noise. This mill is at once diagnosed as the sore spot of the concern. The investigator is enabled to say to the owner: "This is your trouble center; here is where agitation begins. More operatives leave this mill per year than leave mill A. These workers are suspicious of each other's actions, particularly of the foreman's. They feel that you are their natural enemy. The foreman himself is a grouch. More jarring families, more unkempt back yards are represented here than in mill A, and finally the actual efficiency of this mill is less than in mill A, and the work more strenuous." The work is classified as low as 10 per cent., and yet the only difference between the two mills is in noise, speed and lack of rest. The noise is a mechanical engineer's problem, possible of solution. The speed and the fatigue are within the owner's control. With these three factors eliminated, the work would go up to 70 per cent. energizing; as much work would be produced under the better conditions, since the force could be kept as intact in mill B as in mill A.

Diverse Treatments of Industrial Doctors

Two doctors of industry would treat mill B in opposite ways. In order to increase the production, one would increase speed, ignore the noise, study the motions to eliminate waste moments and by the unanswerable argument of figures show you that production must go up. This is the headache powder method and leads to a constantly broken, shifting, dissatisfied working force. The second doctor would decrease the speed and cut down the noise, insist on carefully determined rest periods and thereby maintain a sound organization of skilled workers. Equally important, he would raise the general efficiency and hence the economic efficiency of the community. Nor would he stop at that, for he would further strive by known methods to introduce additional conditions, so that the work in both mills would be brought to about 80 per cent., which would probably be the limit for this class of work.

It should be noted that where the work is done under conditions which permit the operatives to talk, without interference to their work, the rating is much higher than where such is not the case. When we walk out, habit cells control the action, but we can walk and think at the same time. The same principle holds in automatic occupations. If the motions are not too rhythmic, both of the hand and of the machine, and conversation is permitted and encouraged, the work is not nearly so repressive. In a certain mill, employing girls at strictly automatic work, the employees were placed facing one way, so that one operative looked upon the back of another; between adjacent operatives was a small partition. This mill had to replenish its entire force each year, until the scheme was changed to a round table plan, which encouraged conversation. After this the losses were normal.

An Example of Shop Psychology

An interesting case of shop psychology is the following: In a certain piano factory a number of girls were employed to assemble the mechanism which transmits the action when the key is struck to the strings. Each girl attached a piece with a limited number of motions, and was paid on the piece-work plan. These employees were the most discontented in the firm, and were constantly shifting to other occupations. Various means, such as rest rooms and decorated surroundings, were tried without success. As a last resort, the foreman got a fine big Maltese cat and placed it in the room one morning before the girls arrived. This solved the trouble completely. The cat compelled rest periods, for every now and then it would jump into a girl's lap and take her attention from her work for a few moments, and in this way relieved the tension of the high speed and permitted the elimination

of fatigue poisons at irregular but sufficient intervals. Every girl planned at home to bring something in her lunch basket for the cat to eat, whereas attempts to get them interested in the decorating of rooms failed. When girls left this firm and went elsewhere, where there was no cat, they quickly returned. Production increased and peace reigned. The commercializing of a woman's instinct for a cat probably energized the work 10 per cent. It was found also that the introduction of the cat began to arouse an interest in the other betterment plans, which had originally failed. This particular case is worthy of a very careful psychological analysis.

Work Must Be Stimulating

The details just stated are cited not so much to show specific methods of procedure as to emphasize the basic fact that we are, individually and collectively, human units, towns, states and, as a nation, what our work makes us. We have just pulled out of a thousand-year swamp up to firmer ground, and whether we go higher or begin to slide back depends upon how energizing our work is.

It is fundamental that mankind must do stimulating work or retrogress. This is the bedrock upon which our constructive programs of education, industry, sociology, of living, must rest. Fortunately we are now far enough away from the thousand-year swamp so that one may safely propose, as a thesis, that only that civilization will prevail whose laws and life conform most nearly to natural law. The spirit of unrest, whether it be evidenced by the spontaneous and seemingly unaccountable strike of automatic workers, the questioning introspection of university faculties, the open defiance of law or the cry for the doctor of industry, is the headache giving warning of deeper seated organic trouble.

The worth of education, our laws, our scientific management will be determined by the extent to which they make clear, conform with and supplement the laws of work. Their test will lie in the degree to which they are useful in leading us safely forward to better, brighter conditions of work, and their basic idea must be service to the mass.

I like to think we are coming to a time when the great march forward of civilization will not be largely a matter of chance, with the blind often leading the blind, but more an organized, orderly movement in conformity to the laws of nature. In that day the opportunist will not vault into the saddle of leadership when humanity, having been badly led, cries out for a leader. Instead, he will be a part of history with the medicine man of the savage, for at the bottom both of these in their creation and in their haphazard panaceas are the same. On the contrary, humanity will send out a well trained, well equipped vanguard of research men—physicists, bacteriologists, chemists, psychologists, biologists—to explore beyond ranges of the known. It will send its historians back over the line of march to learn the lessons of past successes and failures; it will establish outposts where the facts uncovered will be formulated into laws; and from the outpost to the last mite of humanity will be an established way for the application of the law to the need.

The Standard Machinery Company, Mystic, Conn., has been obliged to increase its plant materially in the last six months on account of the growth of its business. The company manufactures bookbinders' machinery, embossing presses, paper-cutting machines, ball-bearing drill chucks, etc. Contracts have recently been received for the building of several new machines which are to be placed on the market. One is a 16-ton machine for making steel barrel staves; another is for making muslin bags, which takes the material from a roll and prints, cuts and sews the bag at the rate of 75,000 to 100,000 a day; another is for a machine to color and print tubes; another is for a machine to make egg-case compartments. The company takes special pride in the high character of the gray iron castings produced in its foundry.

The Stephens-Adamson Mfg. Company, Aurora, Ill., has received the order for the unloading and conveying apparatus for the equipment of the hopper self-unloading conveyor boat referred to on page 1020 of *The Iron Age* of November 9 as under contract to be built by the American Shipbuilding Company, Cleveland, Ohio.

The Canadian Sirocco Company, Ltd.

The American Blower Company, Detroit, Mich., with a factory also at Troy, N. Y., and branch offices throughout the world, has at last come to realize the importance of the Dominion of Canada, as evidenced by the application just filed for a charter for a company to be known as the Canadian Sirocco Company, Ltd., to be located at Windsor, Ontario. This company has acquired from the city of Windsor a tract of land, centrally located, comprising about four and one-half acres, situated on the Essex Terminal Railway, and will erect a plant which will doubtless be one of the most complete of its kind on this continent.

The company is proceeding at once with the construction of the erecting shop, 50 x 200 ft., to be of steel and concrete construction, also the office building. This is about all that it seems possible to complete for occupancy this winter. In all probability the foundry building will come next and will be started in the spring.

The Canadian Sirocco Company, Ltd., will hold the exclusive patent rights for the manufacture in Canada of Sirocco fans and blowers, which have won a high place in the trade of the world by their space and power saving features. These patents are controlled in the United States, the United States possessions, Mexico, Central America, South America and Japan by the American Blower Company and in Europe by Davidson & Co.'s Sirocco Engineering Works, at Belfast, Ireland, the home of S. C. Davidson, the inventor. Sirocco fans are now being specified and used all over the world for mechanical draft on boilers, mine ventilation, heating and ventilating plants, for public buildings, school houses, factories and stores, and are used exclusively in the British Navy.

The Canadian Company will also manufacture the full line of the American Blower Company products, consisting of fans, blowers, heating, ventilating and drying apparatus, steam engines, steam traps, etc.

The blower business is so interwoven with the science of pneumatics, thermo-dynamics and electricity that it is essentially an engineering industry, the expert knowledge of how to apply such special apparatus for producing efficient results almost predominating the apparatus manufactured and employed. The claim is made that no company in the world is better equipped in this line than the American Blower Company, and the Canadian Sirocco Company, Ltd., enters the Dominion of Canada with this most complete engineering staff at its disposal, establishing at the outset a unique position.

The Canadian Duty on Wrought Pipes or Tubes

The Customs Department of Canada has issued an order regarding the application of the special or anti-dumping duty to wrought pipes or tubes. It provides that this special duty shall not apply under certain circumstances, as given below:

"In respect of iron and steel tubing, threaded and coupled or not, 4 in. or less in diameter, when the difference between the fair market value and the selling price of such tubing to the importer in Canada does not exceed 5 per cent. of its fair market value; provided, that the whole difference shall be taken into account for special duty purposes when exceeding 5 per cent.; provided, further, that the special duty shall, without exemption allowance, apply to iron and steel tubing, threaded and coupled or not, over 4 in. and not exceeding 8 in. in diameter, such tubing being of a class or kind made in Canada."

A New Carnegie Shape Book

Users of structural shapes will be gratified at the appearance of a 256-page "Shape" book superseding the book of shapes issued in 1903 by the Carnegie Steel Company. It contains profiles, tables and data pertaining to shapes, plates, bars, rails and track accessories. It is a character of book too well known to require extended description. It is indexed at length, generously illustrated, and, of course, given up to a large number of tables of weights and the like. A copy of the publication, it is stated, may be had by engineers on application to any of the district offices of the company.

The Physical Properties of Cast Iron*

Their Independence of the Chemical Composition of Pig Iron and Their Relation to Methods of Blast Furnace Operation

BY JOHN JERMAIN PORTER,†

It is perhaps not too much to say that the adoption of chemistry by the foundry has been responsible for a large part of the amazing advance of this industry during the past decade. Within this period mixing by analysis has become the rule rather than the exception, and so much has been published and is now available along this line that further discussion seems superfluous. There is, however, a related point in connection with the selection of pig iron for the mixture, which has thus far received scant attention, but which is, in my opinion, worthy of most earnest consideration by foundrymen, and perhaps even more so by iron merchants and manufacturers. I refer to the great difference which exists in the behavior of many brands of pig iron and which apparently cannot be accounted for on the basis of chemical composition as ordinarily determined.

In former days, now happily past, the old time founder, innocent of chemistry, swore by brands and possessed as part of his stock in trade a list of such as had proved in his experience satisfactory and unsatisfactory. To the chemist this was ridiculous. From his standpoint two irons having the same composition must have the same properties and give the same results, irrespective of brand name or anything else, and so earnestly has this doctrine been preached that his theory has won very general acceptance. It is far from my intention to belittle the value of chemistry in the foundry or to deny the utility of analysis as a means of judging of the quality and fitness of an iron. Nevertheless, I must take exception to the view still held by many chemists that analysis is everything, and maintain that there is something to be said for the arbitrary preferences of the older generation of founders. I believe it to be the case that there are many irons which have practically identical analyses and yet show marked differences in such important properties as strength and shrinkage, and I will now offer what evidence I have to support my views on this point.

Evidence as to Pig Iron Differences

Perhaps the most convincing evidence that has come to my notice is contained in a paper entitled "An Introduction to the Effect of Structure Upon the Physical Properties of Cast Iron," presented by F. J. Cook and G. Hailstone before the British Foundrymen's Association in 1909. In this paper it is recorded that of two mixtures practically identical in chemical composition the one was invariably much lower in tensile strength than the other, and this difference persisted through a great many heats and over a long period of time. The poorer mixture averaged about one-half of the strength of the better mixture, and in none of the 60 cases given is the strongest bar of the poor iron equal to the weakest bar of the good iron. The following analysis and tests are given as typical of the series, and in view of the exceedingly close agreement of these analyses it is evident that we must look elsewhere for the cause of the very great difference in strength.

	A.	B.
Tensile strength, tons per sq. in.	9.1	18.3
Total carbon	3.250	3.092
Graphitic carbon	2.397	2.289
Combined carbon	0.853	0.903
Silicon	1.328	1.314
Sulphur	0.095	0.101
Phosphorus	0.923	0.909
Manganese	0.290	0.335
Iron, by difference	94.114	94.149

A few years ago I was called into consultation by a certain foundry regarding a persistent case of trouble with shrink holes in small chunky castings. It had been found by the foundry superintendent that the extent of the trouble apparently bore some relation to the mixture

used, and hence experiments were carried out to determine what constituent or constituents were responsible for the difficulty. I am not at liberty to give full details of the results of these tests, but an outline of the experiments is as follows:

There were six brands of pig iron on the yard at the time, representing both Northern and Southern irons. Each of these irons was melted separately by using it alone in the first charge and separating the rest of the day's heat by a blank of coke. Working in this way some 20 of the small castings which had given the greatest trouble were poured from each kind of iron. All conditions were kept as uniform as possible and the experiments were repeated several times with different lots of the various irons to minimize the danger of accidental interference of other factors. Finally, the castings were examined for shrinkage cavities, with the following results:

Brand No. 1.—Castings all good; not a shrink hole in the lot.

Brand No. 2.—Fifty per cent. perfect castings, 50 per cent. with small trace of shrinkage.

Brand No. 3.—Ten per cent. perfect castings, 90 per cent. with small trace of shrinkage.

Brand No. 4.—None perfect; all showed a little shrinkage.

Brand No. 5.—All castings with small shrinkage cavities.

Brand No. 6.—All castings very bad, with large shrink holes.

All of these irons were the ordinary No. 2 and No. 3 foundry grades, and while there was some variation in the analyses there is absolutely no traceable connection between the percentage of any element or combination of elements and the results as to shrinkage. Moreover, the irons were each completely analyzed by a competent chemist and it was determined that the differences in behavior could not be attributed to the presence of any unusual elements or to unusual variations in the proportions of the carbons. Since these original experiments were carried out, others have been made on various mixtures of these brands, and it has been shown that the behavior of any mixture is approximately proportional to the behavior of its constituents, so that with equal parts of Nos. 1 and 6 most of the castings will show just a little shrinkage. It has also been found that the remelt from these irons affects the shrinkage in much the same way as the original pig.

It is quite well known among both foundrymen and blast furnacemen that pig iron made in whole or in part from "mill cinder" is less desirable than that made entirely from ore, although the use of the mill cinder will not as a rule change materially the composition of the pig. The points of inferiority of cinder pig do not seem to be very clearly defined and have probably never been scientifically investigated. Nevertheless they are real enough to affect its sales value, and in England are recognized by the creation of the grades of "cinder pig" as opposed to "all mine pig." I have had some experience in the use of mill cinder in the blast furnace and have noticed that when using a considerable proportion of it the iron was noticeably easier to break on the blocks, and there was invariably a decided increase in the unreduced iron in the slag.

Charcoal and Coke Pig Iron

Again we have the case of charcoal iron, which in spite of the threats of foundry chemists to drive it from the field, is still produced in this country to the extent of some 400,000 tons per year, and is still regarded as indispensable for many classes of work. As far as analysis goes there is but little average difference and no essential difference between charcoal and coke iron. Char-

*A paper read at the meeting of the Pittsburgh Foundrymen's Association, November 6, 1911.

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coal iron averages lower in sulphur, but any coke furnace can and often does produce iron with the sulphur down under 0.01 per cent., which is as good as is expected from charcoal iron. Again charcoal iron averages somewhat lower in total carbon than most coke irons, but here again the difference is not universal, and, if we should judge by analysis only, many coke irons could easily pass as the product of the charcoal furnace.

Coming to the properties of the two kinds of iron, however, it is within the experience of almost every foundryman that there is a difference. This is perhaps most generally noticed in the matter of toughness or strength, which in charcoal iron is much greater, the grains having a tenacity which causes the iron to tear to a marked degree rather than breaking off short. It is also noticed, however, in the properties of shrinkage, tensile strength and depth and character of chill, and since there is such a difference in properties and such a similarity in composition I think it safe to say that we have here a notable example of that elusive difference which escapes the arts of the chemist.

Finally, I might cite the experience and opinions of many competent foundrymen who have found the facts to be as I have stated. One authority in particular, Dr. R. Moldenke, has repeatedly called attention to these conditions, and if time permitted I might read many quotations from his papers confirming the facts which I have just brought out.

Theories in Explanation

Although we may recognize the fact that differences in pig iron may exist which cannot be accounted for by analysis, the explanation of these differences is another and a very difficult matter. It is true that, as in the case of steel, the methods of metallography furnish a clue, and under the microscope the structure of cast iron often shows remarkable variations. Cook in the example first cited found that his strong iron showed under the microscope a peculiar net work structure of the phosphide eutectis combined with much finer graphite than existed in the weak mixture. It is well known that charcoal iron is finer in grain than coke iron of similar composition and that this closer grain is an almost invariable accompaniment of strong iron. Hence we may assume that a part at least of the differences in pig iron is due to the variations in size, shape and arrangement of the graphite flakes. This is all right as far as it goes, but is only pushing the matter back one step and is not satisfactory as an ultimate explanation. In seeking the real explanation five possible theories have suggested themselves, and these I will take up in order.

1. THE MANNER OF COOLING.

It has been known for many years that the rate of cooling is an important factor in determining the percentage of combined carbon, and lately it has become appreciated that it may also affect iron in other ways than through the combined carbon. For example, Custer, in his work with permanent molds, has shown that graphite size may be controlled without change in ultimate composition by varying the rate of cooling through the solidifying range; and others have found that hardness and electrical properties may be varied through, quite wide limits by controlling the rate of cooling through a much lower range and without appreciably affecting the carbons. In my opinion this possibility is due to a change in the allotropic state of the iron which takes place at about 1400 deg. F. and which is not made evident by chemical analysis.

However, though granting that the manner of cooling may produce many important changes, I still cannot believe that this theory is competent to account for the examples previously given. In the case of both Cook's experiments and those coming within my own experience, rate and manner of cooling were as nearly similar as it was possible to make them, and the number of pieces tested was too great to permit of the possibility of a coincidence of accidental variations in this factor. Moreover, the persistence of the differences after the remelting of the irons cannot be explained on this basis.

2. FORM OF COMBINATION OF CONSTITUENT ELEMENTS.

Another theory which may possibly be thought by some to afford an explanation is the manner in which the elements of the pig iron are combined. There are six elements present in cast iron and some 12 or 15 con-

stituents are possible through the different forms of combination of these elements. There is, however, nothing to indicate that there is anything in this theory, and even if we could account for it on this basis there would still be the question why two brands of the same elementary composition should have their elements combined in such different ways as to produce different properties.

3. DISSOLVED NITROGEN.

Of late years considerable attention has been given to the gaseous impurities of steel, and it has been found that nitrogen is a rather common and a very detrimental impurity. May it not be the case that the presence of more or less of this element (which is not determined in the ordinary analysis) explains the differences which I have described? This appears a more likely explanation than any of those thus far cited. I do not, however, regard it as the right one, or at least the chief one. There is very little evidence either for or against it, but such as there is appears to be against it. The well-known experiments of Braune (Stahl und Eisen, 1906), seem to indicate that nitrogen is seldom or never an important factor in gray cast iron, although it may be sometimes in white or chilled iron; and Gayley (Trans. A. I. M. E., 35, 986) has described some tests made on the nitrogen content of different classes of pig iron in which he found that there was apparently no relation whatever between the amount of nitrogen and the quality.

4. DISSOLVED OXYGEN OR OXIDES.

Perhaps the most generally accepted theory to account for otherwise unexplainable differences in cast iron is to assume the presence of variable amounts of oxygen in the metal. This theory is due more especially to Dr. Moldenke, who in several papers has cited considerable evidence in its support. Perhaps the most conclusive evidence is the actual isolation of magnetic oxide, Fe_3O_4 , from samples of iron which have been badly burnt on the hearth of an air furnace and which are known to have had the characteristics commonly attributed to oxidized metal. This theory fits in well with all that is known regarding the relation between blast furnace practice and the properties of the iron made. For example, mill cinder is a particularly difficult material to reduce, and, as before mentioned, it has a well marked detrimental effect on the quality of the pig iron produced. Still another example mentioned by Dr. Moldenke is the difference in quality between malleable Bessemer made in a lightly blown furnace and regular Bessemer made in a furnace driven to the limit.

5. OXYSULPHIDES.

While accepting as probably substantially correct this last theory, I would suggest that possibly a modification of it may be still nearer the truth. It is generally assumed that the oxygen is present as dissolved oxide of iron, but it seems to me possible if not probable that it may be rather in the form of an oxysulphide of iron. This compound has been shown by Campbell (Iron and Steel Inst. Jour., 1903) to be capable of existing in iron and steel at high temperatures and to have remarkable powers of diffusing through the solid metal. LeChatelier has also proved its existence.

The evidence as to its presence and influence in commercial iron and steel is only indirect, but there is some circumstantial evidence pointing in that direction. It is quite noticeable in blast furnace practice that following a slip bringing unreduced ore into the hearth there is a most evident association of badly oxidized iron and very high sulphur. It is also well known that it is particularly difficult to keep the sulphur down when smelting mill cinder.

In Lake's "Composition and Heat Treatment of Steel," page 82, I find the statement that steel which has been completely freed from gaseous impurities can be quite high in sulphur without its quality being apparently injured. Again in a paper by Herbert Pilkington on "Cast Irons for Foundry Purposes," read before the British Foundrymen's Association in 1911, it is stated that many of the best cold blast charcoal irons contain 0.10 per cent. sulphur and up, and that this quantity, which would be ruinous to ordinary pig, does not in this case produce unsoundness or other bad effects. Finally, I know of several observant foundrymen who are quite certain that sulphur is sometimes much more injurious than at others,

and this fact, if such it be, may or may not be caused by its association with variable amounts of oxygen in the form of oxysulphide.

The Effect of Varying Blast Furnace Practice

Thus far my discussion has been largely academic. A more practical question is the relation between blast furnace practice and the presence in the pig iron of these injurious properties, however they may be caused. Unfortunately we have not enough data to draw exact conclusions, or, indeed, any conclusions. My observations have led me to accept as a tentative theory the rule that the less oxidizing the conditions under which the iron is made the better will be its quality. In other words, satisfactory iron should be made from easily reducible ores, with a moderate rate of driving and with not too much economy of fuel. These conditions, if correct, are rather hard on the furnaceman and it is to be hoped that further information may modify them somewhat. It is a significant fact, however, that in a large number of cases the irons having the highest reputation for low shrinkage and general good casting properties are made in small furnaces inadequately provided with blowing capacity and hence lightly driven, and using brown hematite or other easily reducible ore.

I have thus far been unable to determine whether those factors in the operation of the furnace which are within the control of the furnace manager have any important effect upon these properties of pig iron, but it is probable that to some extent they have. It is a well known fact that the grain of the pigs may be varied within wide limits without regard to composition by varying the basicity of the slag and the temperature of the hearth. It is also well known, however, that upon remelting the character of the grain is changed and becomes normal, and so far as I know it has never been shown that the size of the grain in the original pig bears any relation to the properties of the iron after remelting—at least none which cannot be explained on the basis of composition.

On the other hand, I have noticed certain indications which lead me to believe that it is possible to accomplish something by the way the furnace is handled. For example, it appears that the bad effects of mill cinder may be at least partly nullified by slow driving and the use of some excess of fuel. Again, magnetic ore appears to make a satisfactory foundry iron, although it is very hard to reduce, but furnaces using it are generally driven rather slowly. Reasoning entirely from theory, it seems likely that the presence of ferrous silicate in the ore, the formation temperature of the slag (not the melting point), the temperature of the hearth and the freedom from slips may all have something to do with the quality of the iron. It would be interesting to follow up some of these points; for example to compare the iron made by the use of dry blast with that made under otherwise similar conditions but using moist blast. Dry blast greatly increases the hearth temperature, thus producing conditions identically opposite to those under which cold blast charcoal iron is made; yet it is quite possible that it may produce an effect of the same kind on the pig, although less in degree.

Practical Applications

The practical application of the facts which I have here tried to bring out may not seem to be of any great importance, but I am not so sure that this is the case. Some time ago I had a talk with a foundry superintendent of very broad experience, and in discussing the experiments on fluid shrinkage previously described he insisted that to many foundries this property is one of the most important and difficult problems and is responsible for a much larger number of defects than is generally supposed. According to this gentleman, the question of the influence of brands upon this property is well worth the study of the practical foundryman. There are, of course, many foundries where neither fluid shrinkage nor high strength is of any particular importance; but on the other hand there are some classes of work where one or both of these properties is of very great importance, and in such cases it appears to me that a knowledge of brand characteristics is almost indispensable.

As there is no published and very little privately held information along these lines, it is necessary for each founder to gather his own data, and the procedure which I recommend is as follows:

1. A fluid shrinkage and transverse strength test from each heat.
2. A continuous record of the results of these tests and the mixtures used.
3. Occasional tests of the different brands melted separately.

In regard to the test for fluid shrinkage I have found that originally recommended by Cook and consisting of a casting in the shape of a K with the legs about 1 in. square in section to be very satisfactory. When this casting is broken at the junction of the legs any tendency towards fluid shrinkage will be evident there. In using this test it is convenient to construct a scale consisting of a series of from four to eight broken K castings of varying degrees of badness. These are mounted in a box and given suitable numbers. Thereafter, it is sufficient to compare any test piece with this scale and record as its shrinkage the number on the scale most nearly resembling it.

It will be evident that obtaining these data need not be at all burdensome to the foundry undertaking it, since no special apparatus is called for, except a transverse testing machine, and the extra work involved will hardly amount to 20 minutes per day of a helper's time. Even the special tests of separate brands need not interfere with ordinary foundry routine since they can be run as the first charge in a regular heat.

Another conclusion which might be drawn from the facts brought out is that there is a great opportunity for some of the manufacturers and sellers of foundry pig iron to make strong selling points of these special virtues, once they have found them in their brands. I am quite convinced that the larger commission firms would find it very much to their advantage to have the properties of the brands they handle thoroughly tested so that they could sell them more intelligently. A pig iron salesman armed with this information and some foundry lore would indeed deserve a better name than the now sometimes given title of "hot air artist."

Finally it appears to me that the recognition of the injurious effects of the gaseous impurities in cast iron will give a fresh argument to the electric furnace man. I have long thought that it should be practicable to use an electrically heated receiving ladle or mixer in connection with either a blast furnace or cupola. Here the iron could be partly refined, treated with deoxidizing alloys, adjusted in composition and brought to any desired casting temperature. And since there would be no melting to do, the amount of electrical energy needed would be relatively small. Operated on a sufficiently large scale to take care of the fixed charges, it appears to me that this combination could be made profitable for some lines of work.

The Cleveland-Cliffs Iron Company, Cleveland, Ohio, is issuing \$2,500,000 in 6 per cent. collateral trust bonds, dated November 1, 1911, and secured by the entire capital stock of the Cleveland Iron Mining Company, \$2,500,000, and the entire capital stock of the Iron Cliffs Company, \$1,000,000. A part of this issue has been placed at par and interest by the Citizens Savings & Trust Company, Cleveland, and a part of it was set aside to be allotted to the stockholders of the Cleveland-Cliffs Iron Company, provided they subscribed for it on or before November 15. These notes will mature \$500,000 semi-annually, beginning November 1, 1913, but are subject to call on any interest date up to and including November 1, 1913, at 101; after November 1, 1913, up to and including November 1, 1914, at 100½; after November 1, 1914, at par. Each of the iron companies whose stock is pledged for this issue owns its property in fee, and the combined properties have an assessed valuation for taxes of over \$6,000,000.

The following changes in the sales organization of the Wheeler Condenser & Engineering Company, Carteret, N. J., relating to the Philadelphia and Cleveland territories have been announced: George Franklin Pond has been appointed manager for the former district, with an office in the Commonwealth Trust Building, Philadelphia, while the interests of the Cleveland section will be looked after by Walter G. Stephan, who has an office at 1325 Citizens Building, Cleveland.

New Single-Phase Electric Motors

Unity Power Factor a Special Feature of a Recent Wagner Development

Ability to operate at unity power factor at full load is the special feature ascribed to a new line of single-phase motors that have been designed by the Wagner Electric Mfg. Company, 6400 Plymouth avenue, St. Louis, Mo. In general the construction and design of

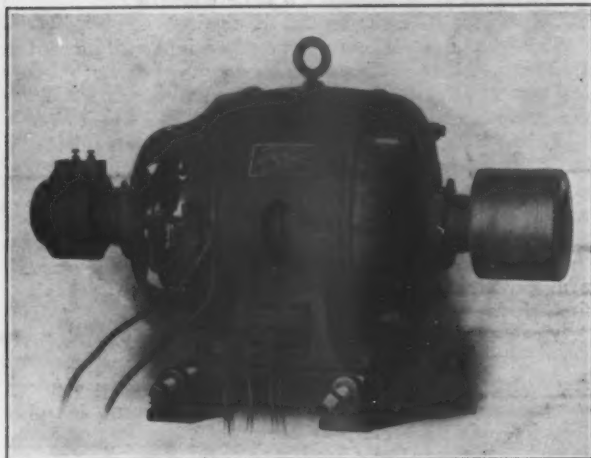


Fig. 1.—The Type B K Unity Power Factor Single-Phase Electric Motor Built by the Wagner Electric Mfg. Company, St. Louis, Mo.

the motor follow the company's standard line with the exception that two windings are used on the stator instead of one. Fig. 1 is a view of the motor, while Fig. 2 gives details of the stator windings and a section through one slot of the rotor showing its construction. The application of this new motor to machine tools is brought out in Fig. 3, which shows a milling machine driven by one of them.

Referring to left portion of Fig. 2 it will be noticed that the stator or field construction employs two windings instead of one. The main winding *a* produces the initial field magnetization in the regular way, while the auxiliary winding *b* controls the power factor or compensates the motor. The main departure is in the rotor, the construction of which is indicated at the right of Fig. 2. Two windings are employed in this part, the main or principal winding *c* being of the customary squirrel cage type and occupying the bottom of the rotor slots. The auxiliary winding *d* is of the regular commuted type and occupies the upper portion of the slot, the two windings being kept apart by a magnetic separator, *e*, which is a rolled steel bar. The auxiliary winding is connected to the standard type of horizontal commutator.

Two sets of brushes are employed, as indicated in the diagram of connections at the left of Fig. 2. The main pair

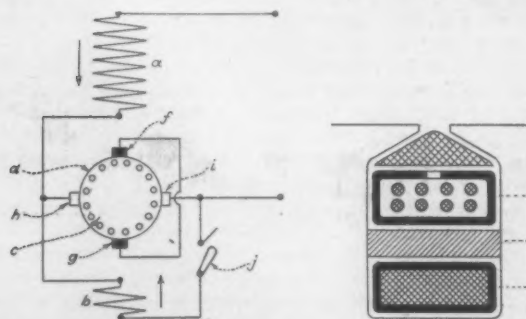


Fig. 2.—Details of the Stator Winding and the Rotor Construction.

of brushes *f* and *g* is placed in the axis of the main stator winding and is short-circuited, while the auxiliary pair of brushes *h* and *i* is placed at right angles to the axis of this winding and is connected in series with it at starting. The auxiliary winding of the stator is connected permanently

to the brush *h* and can be connected to the other auxiliary brush *i* through the switch *j*.

The object of the employment of this peculiar rotor construction and arrangement of brushes and connections is to accentuate at starting the effect of the squirrel cage along the axis of the main stator winding while suppressing it as far as possible along the axis which is at right angles to the winding. The magnetic separator has a tendency to suppress the effect of the main rotor winding along all axes by making it less responsive to outside inductive effects. The influence of this separator is however nullified along the axis of the main stator winding by the employment of the short-circuited brushes *f* and *g* while no means are provided for nullifying its effect along the axis at right angles to that of the main stator winding. In this way the main stator winding induces heavy currents in both rotor windings because of the short-circuited brushes and in spite of the magnetic separator, while the auxiliary rotor winding connected in series with the main winding of the stator will not be able to produce heavy current in the other rotor winding along the axis *h-i* because the magnetic separator between the two rotor windings shunts the inducing magnetic flux.

The mechanical structure of the new motor gives practically no outward evidence of its unique construction. In place of the switch *j* a small automatic centrifugal switch located on the outer extension of the rotor shaft serves

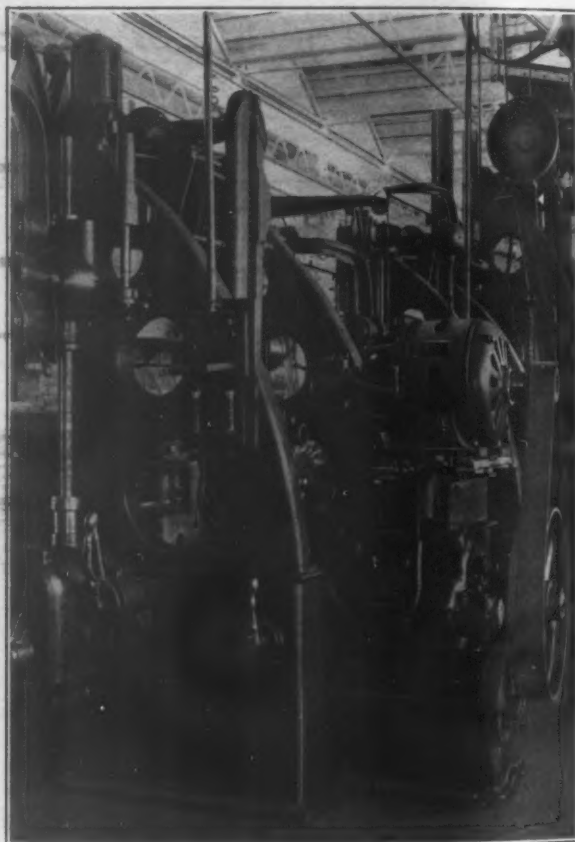


Fig. 3.—One of These Motors Driving a Milling Machine.

to connect the compensating winding to the auxiliary brushes after the motor has been brought up to speed. Other special features of the motor are that a large portion of the rotor currents are carried by the squirrel cage winding in normal operation, thus imposing light load service on the commutator, which is also lightened by the suppression to a large extent of the short circuit currents which tend to flow in the individual coils of the commutated winding as they pass under the brushes, due to the close proximity of the two rotor windings.

The employment of the squirrel cage winding it is pointed out secures a remarkably constant speed at all loads, the speed variation curve obtained from a test showing a drop of approximately 50 r.p.m. while the load was increased from 0 to 9 hp. Another advantage of the squirrel cage is that racing of the motor is eliminated.

In general the method of operation is as follows: In

starting the switch *j* is open and the auxiliary rotor winding is connected in series with the main stator winding and across the supply mains. The latter winding induces a large current in both rotor windings along its axis and the auxiliary rotor winding produces a large flux along the axis at right angles to this. The rotor currents in the main axis, operating in conjunction with the flux threading the rotor along the right angle axis, yield the greater part of the starting torque. As the motor speed is increased the squirrel cage gradually assumes the functions which it performs in the ordinary single-phase squirrel cage motor, developing a magnetic field of its own along the axis *h-i* and a correspondingly powerful torque which increases rapidly as synchronism is approached but falls suddenly to zero at or near the point of actual synchronism.

The magnetizing currents circulating in the bars of the squirrel cage of a single-phase motor have double the frequency of the stator currents with the result that the fluxes they produce are of double frequency. The solid steel magnetic separator forms a shunt for the fluxes of line frequency induced from the stator that is fairly effective but which cannot shunt the double frequency fluxes produced by the rotor. As far as the squirrel cage is concerned, the effect of the magnetic separator diminishes as the speed increases, and at synchronism the machine operates practically in the same manner as if this separator did not exist at all.

The Sauer Transmission Gear

For varying the speed of turbines, motors, propellers on ships, and practically all machinery where an increase or decrease of speed is required, the Sauer Power Generating Company, 5115 Rosetta street, Pittsburgh, Pa., has



Fig. 1.—A New Transmission Gear for Varying the Speed of Turbines and Machinery Built by the Sauer Power Generating Company, Pittsburgh, Pa.

placed on the market a transmission gear by which the speed can be changed easily while the gears are running. The device consists of a high and a low speed shaft and one or two countershafts, the two former being in one straight line but disconnected. Fig. 1 is a view of the complete gear with the cover and the lever attachment removed, while in Fig. 2 the gear is shown partly dismantled and the removed countershaft illustrates the maker's adjustable eccentric bearings with arms and link pins for the lever attachment.

The employment of two countershafts with eccentric bearings so arranged that when one pair is above the center the other is below is said to enable the gear to be thrown out of motion by a single movement of the lever with the result that the gear meshes easily while running. In a unit installed in the builder's plant and operating at a speed of 9000 r. p. m. the gears have been thrown out of motion or brought into engagement with little trouble and practically no noise. The tongues in the center of the larger gears regulate the side motion and help to keep the gears in mesh and reduce the friction. The adjustable bearing is of the same general type as the one illustrated in *The Iron Age*, August 25, 1910, and compensates for wear, thus keeping the shafts in line.

It is claimed that the gear will transmit twice as much power as another gear of the same width and strength, since the power is transmitted on two sides and by twice as many teeth. As the high and low speed shafts are in the same line it is possible to install this gear on ships already equipped with turbines without removing them from

their foundations by simply cutting the propeller shaft and inserting the gear. Among the special features of the gear are that side and end thrust are eliminated from both the driving and the driven shafts and the gears are very com-

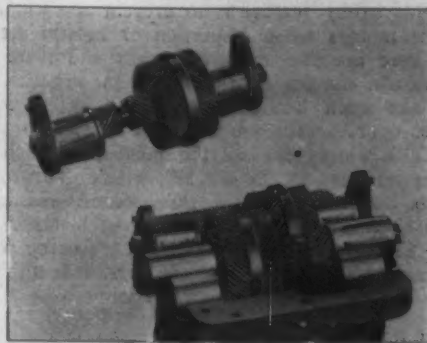


Fig. 2.—The Gear Partly Dismantled, Showing the Eccentric Bearings Employed.

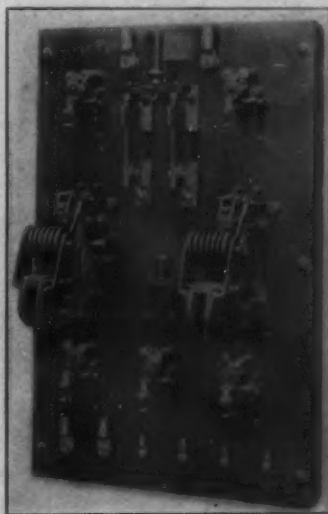
compact, requiring only a small amount of space in proportion to the power transmitted.

There is said to be very little or no oil leakage, since the main shafts have stuffing boxes and the countershafts are equipped with caps. The circulating oil system can be used to supply any number of bearings. The oil runs from a tank to the lower portion of the gear case and the gear acts as a pump to force the oil to the different bearings through pipes which have valves inserted in them to control the flow. After leaving the bearings the oil passes through an oil separator and flows back to the tank.

New Cutler-Hammer Crane Panel

A switchboard panel for the cage or cab of the electric crane, to overcome the scattered arrangement of knife switches, fuses, circuit breakers and other controlling devices common to cranes of three, four or five motors, has been designed by the Cutler-Hammer Mfg. Company, Milwaukee. The panel shown in the accompanying illustration is intended for a three-motor crane, and combines all necessary switches and protective devices, giving protection against overload, short circuit and failure of voltage. A panel of this kind reduces the amount of wiring in the crane cab, makes installation easy and eliminates the cost, inconvenience and time required in renewing fuses. Connections are only required to the line, controllers and fuses.

The two single-pole magnetically operated switches of the standard contractor-mill type, one in each side of the main line, and the "overloads" are the essential features on the panel. The contactor switches have copper and carbon auxiliary arcing



Cutler-Hammer Crane Panel.

contacts and blow-outs, and laminated copper brushes for carrying the current. Two single-pole switches are used because of their several advantages over the double-pole type. They provide two chances of opening the circuit on overload or short circuit. If a double-pole switch should stick, the circuit would not be opened, whereas if either single-pole switch sticks the other will open the circuit, and again, if the overload remains on the line the one switch will be tripped

as soon as the other is closed, thus protecting the motor. The small knife switch handles the control circuit for the above switches and provision is made so that any

number of these safety switches connected in series can be installed in various convenient locations. The operator can then, from any of the points, open the magnetic switch circuits which in turn open the feeds to all motors on the crane. This safety feature is to prevent accidental starting of the motors when inspection or repairs are being made. There are two main overloads and three motor feed overloads, one for each motor on the crane.

With the main line switch and all safety switches closed the operator throws the reset master to position No. 1. This closes one of the magnetic switches and establishes the feed to the second switch. Throwing the master to position 2 closes this second switch. On grounded circuits two "overloads" for each motor on the crane are sometimes provided, and where desired with enclosing cases. These cases can be provided with means for operating the main knife switch without opening the case.

New Wire and Rod Machines

Two specially designed wire and rod machines were recently built by the Philadelphia Roll & Machine Company, Philadelphia, from designs of William P. McGlynn, of Shimer, McGlynn & Co., in whose plant, in that city, they have been installed. The back-pointing and cold-rolling mill, shown in Fig. 1, was designed to point or cold roll rods $\frac{3}{4}$ to $\frac{3}{16}$ in. in diameter, and is of especially heavy and strong construction to roll Monel metal. The housings and all cast-iron parts are made of charcoal air-furnace iron; the rollers are of high carbon cast steel, and the gearing is of cast steel and bronze, all being cut from the solid. The machine is belt driven and is fitted with a duplex reversing friction clutch, which can be operated either by means of the foot treadle or by an automatic stop device at the rear of the mill. The rolls run at 75 r.p.m. in the regular operating direction and 100 r.p.m. in the reverse direction when operating on ordinary material. Shields, not shown in the reproduction, are provided to encase the gears, so that workmen are fully safeguarded.

The wire drawing machine, shown in Fig. 2, was designed to draw rods from $\frac{1}{4}$ to $\frac{3}{4}$ in. in diameter. It is a triple-gear machine and has a ratio of 20 to 1. The wire block, which is 14 in. in diameter, is designed to operate at 20 r.p.m. when ordinary material is being drawn, but the speed can be varied to suit the class of work. All the spur gearing in connection with this machine has cut teeth and the bevel gears cast teeth. All the cast iron working parts are of charcoal air-furnace iron.

As will be noted, the machine is compact and self-contained. It is belt driven and provided with a friction clutch and also has special cut-off pins, which connect the wire block to a large coupling which is secured to the vertical shaft, the wire block being loose and free

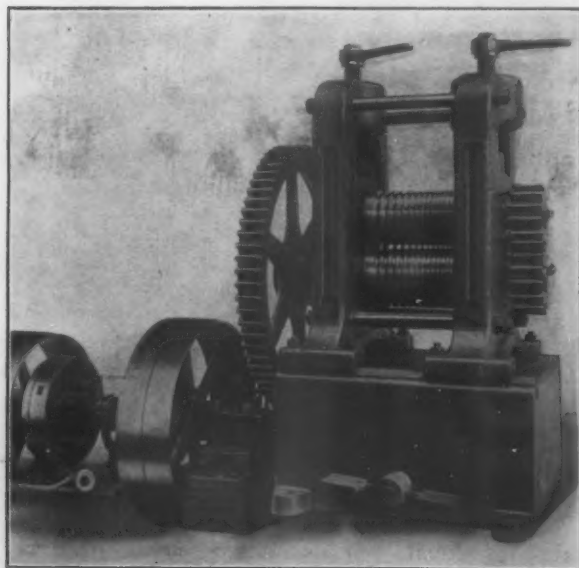


Fig. 1.—Back-Pointing and Cold-Rolling Mill.

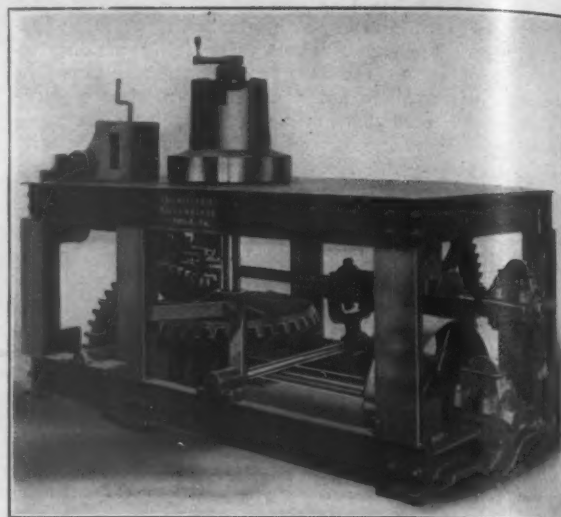


Fig. 2.—Wire Drawing Machine Built by Philadelphia Roll & Machine Company.

to revolve as desired when the pins are withdrawn. In accordance with the latest tendency to provide safeguards wherever possible, the gearing and all mechanism both on the front and back of the machine have been completely encased. Fig. 2 shows the machine with panels removed and the gearing exposed. The panels are flush with the posts and fit between the top and bottom channels of the machine frame, giving the machine as a whole a box-like appearance devoid of moving parts.

Particular attention is directed to the substantial construction of the center frame which supports the wire block and the vertical shaft with its gear. The vise on the wire block is cast steel with tool steel jaws and is not rigidly secured to the block. The arrangement permits a worn or disabled vise to be removed and a new one inserted in a few moments without interfering with the block.

American Ironmasters Safeguarding Their Men

"What took Germany 25 years to accomplish in the prevention of industrial accidents has been effected by the iron and steel industry in the United States within the last three years," said Charles Kirchhoff of the American Museum of Safety, in addressing an audience of iron and steel men at Catasauqua, Pa., last week, under the auspices of the Empire Steel & Iron Company and the Bryden Horseshoe Company.

"This conservation of human life is characteristic, not alone of a few mills and plants," continued Mr. Kirchhoff, "but is quite general. Our iron and steel industry to-day, generally speaking, can come into the court of public opinion with clean hands. From my personal knowledge of some of the largest plants in England and on the Continent, I can affirm that many of our plants from the viewpoint of safeguarding their employees are equal to, and in some cases superior to the transatlantic mills. These facts refute the slanders that are heaped upon our ironmasters, in charging them with indifference to the sanctity of the lives of their operatives. It now rests largely upon the workmen themselves to maintain this standard of safety, by doing all in their power to make continuous use of safeguards and constantly practice safety and caution at their work."

Dr. William H. Tolman, director of the museum, illuminated this philosophy with about 150 lantern slides, showing conditions in the iron and steel trades.

J. H. Plummer, president of the Dominion Steel Corporation, Sydney, Nova Scotia, is reported as stating that the wire and nail plants which the corporation is erecting and equipping will be ready to turn out product by the spring. He further says that the materials for the two new open-hearth furnaces, for a blast furnace and for a bar mill are now assembled, and these additions will be completed next year.

Internal Cold Metal Saw

A Recent Development of the Newton Machine Tool Works

Improvements have been recently made by the Newton Machine Tool Works, Inc., Twenty-fourth and Vine streets, Philadelphia, Pa., in its internal cold metal sawing machine. Among these are the attachment of the feed trolley for adjusting the stock and the use of air clamps

screw A, Fig. 1, is adjusted by hand until the V-block having a toothed face comes in contact with the work. The lever B is then operated to admit air to the clamping device, and this forces the wedge C into position. This part is said to be so positive in action that it is necessary to admit air in the reverse direction to release the clamp. The lever D controls the operation of the cylinder E, Fig. 2. An arm connected to this cylinder holds the metal that has been cut from the bar at F and prevents it from falling into the saw blade when the saddle is returned by the fast power traverse for the succeeding cut. It will

be noticed from Fig. 2 that the support G is designed to come within $\frac{1}{8}$ in. of the side of the blade, and also that the saddle is of heavy box construction. This part has a square locked bearing on the base and side adjustment to take care of wear is made by a taper shoe and by removable clamps for the top bearing.

The machine is shown equipped with a blade for cutting 6-in. stock, and in a recent test extending over several days, pieces were cut from bars of $5\frac{1}{2}$ and 6 in. steel having from 0.40 to 0.45 per cent. carbon, in about 1 min. While these tests show what it is possible for the machine to do at the

which reduce the idle time of the machine to a minimum. Views of the machine from opposite sides are given in Figs. 1 and 2.

The saw blade which is 28 in. in diameter is fitted to the barrel with which it revolves, being fastened thereto by bolts. The gap in the center of the blade is 8 in. in diameter, and eight high-speed removable teeth are inserted on the machine illustrated which has a capacity of 6 in. The barrel to which the blade is attached revolves in large diameter bearings of ample proportions. It is driven by a worm and worm wheel, the teeth of the latter which has an over-all diameter of approximately 28 in. being cut from this barrel. The driving worm, which is of hardened steel, has roller thrust bearings and is fitted to the saddle and travels with it. The drive is entirely incased so that the gears revolve in an oil bath and special provision is made with felt pads to prevent any of the lubricant coming in contact with the bearing surfaces. The machine is driven by a 30-hp motor through one gear connection in addition to the worm and worm wheel connection for the saw blade. The saddle has reversing fast power traverse and six changes of geared feed are available. Hand adjustment is also provided and the driving gears with the exception of the worm wheel on the saw barrel are of either steel or bronze.

In operation the feed trolley is located at the extreme end of the guide and a 16-ft. bar of stock lifted into place. After the first cut the bar is adjusted and the clamping

same time the builder does not recommend that the machine be used for handling such heavy stock as the teeth of the saw blade would not be able to stand the strain of taking such heavy cuts if regularly used on this class of work for any considerable period. The machine is, however, guaranteed for feeds of from 2 to 3 in. per minute on stock having a carbon content of from 0.40 to 0.45 per cent. One of the features of this test was that while it was being conducted the machine was placed on the

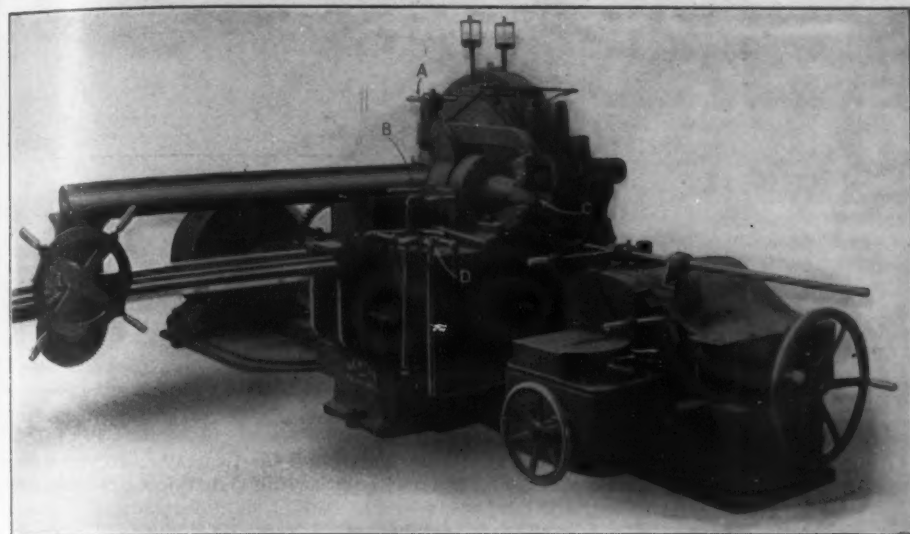


Fig. 1.—The Operating Side of a New Internal Cold Metal Sawing Machine Built by the Newton Machine Tool Works, Inc., Philadelphia, Pa.

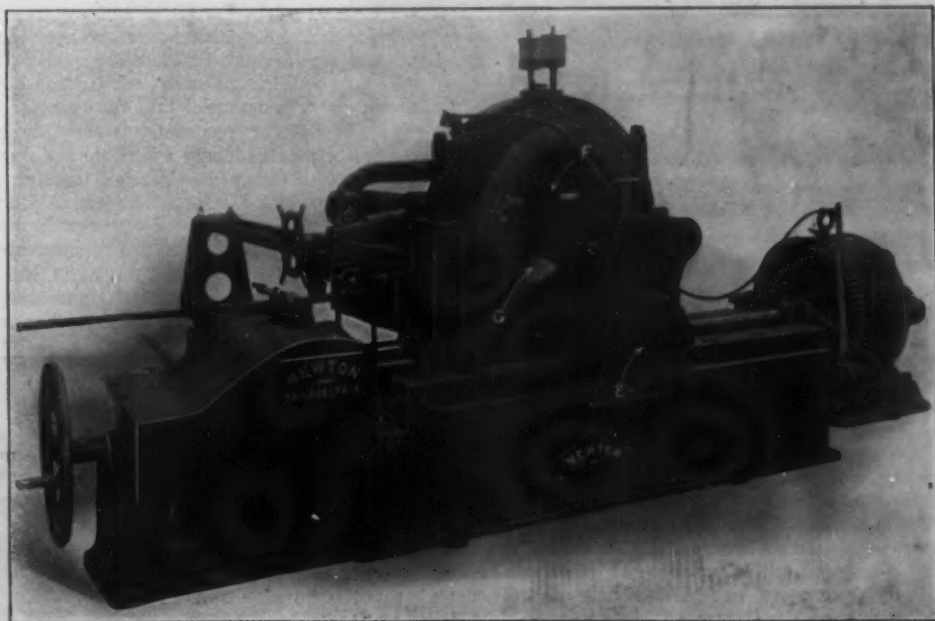


Fig. 2.—Rear View Showing Attachment for Keeping the Cut Pieces from Falling Into the Saw.

builder's erecting floor and was not supported by a foundation or foundation bolts, its bulk being sufficient to overcome all vibration.

The construction of the new machine follows the builder's line in general. The floor space occupied by the machine is approximately 14 by 20 ft. and the net weight is about 23,000 lb.

The Chronograph

Details of an Electrically Controlled Recorder

A time recorder controlled electrically by a master clock for use in manufacturing establishments and business houses has been brought out by the Stromberg Electric Company, 1252 Marianna street, Chicago, Ill. The mechanism has no pawls, springs nor dogs to get out of order and the action is positive. The printing wheels are locked, thus preventing their movement except by the electric impulse. There are also no clock works in the Chronograph, the printing wheels and the hands of the dial being moved by a simple magnetic action, which receives the impulse from an electric current that is controlled by an automatic contact attached to a master clock. It is possible to operate any number of clocks from 1 to 100, which can be located at different places and controlled by the one master. The master clocks are furnished in two types, one for key winding and the other self-winding. Either 110 or 220 volt direct current or a storage battery is used to operate the Chronograph. Three different styles are illustrated, Fig. 1 showing the in-and-out recorder for time card use, while Figs. 2 and 3 illustrate the cost and labor keeping styles respectively.

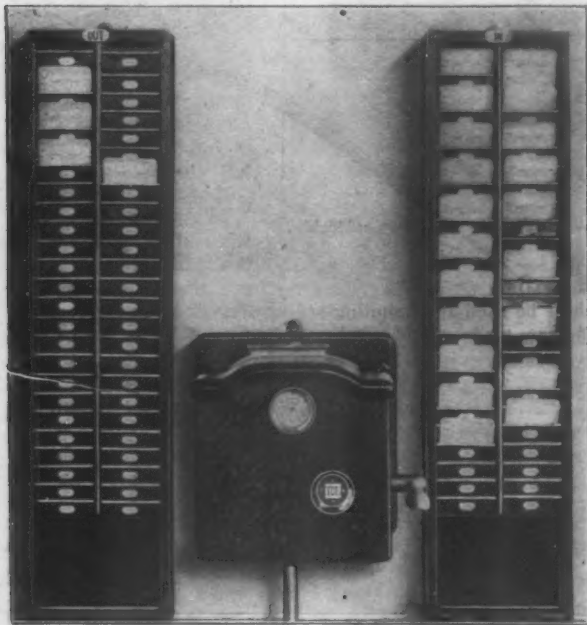


Fig. 1.—The In-and-Out Card Time Recorder, Made by the Stromberg Electric Company, Chicago, Ill.

The Various Types of Machines

The in-and-out time recorder illustrated in Fig. 1 does not differ very materially in principle from the other card recorders now on the market. There is, however, this advantage in employing the Chronograph for recording the arrival and departure of employees as the clock mechanism is taken out of the machine itself. In this way it is possible to secure accurate records since the constant pounding and jarring of making registrations that occur in the case of self-contained recorder and affect the delicate clock work are eliminated. It is also possible to have the master clock located in the office away from the dirt, dust and vibration of the factory and install as many stations as may be needed in the various departments of the plant since the cost is not excessive. The advantages of this system as compared with other time recording systems are a cost of approximately one-half, simple operation and rapid recording. This instrument is made in two types, one with a hand shift recorder, where the change for registering from day to day is made by hand and the other where this change is done automatically at midnight. Both recorders are fitted with movable funnels which receive the cards for registering and which are moved for in and out, afternoon and overtime, the location for registering being shown by an indicator which is in plain sight, as well as the date or the day of the week for registering. If desired these funnels can be locked in position.

For keeping a record of the cost of producing various

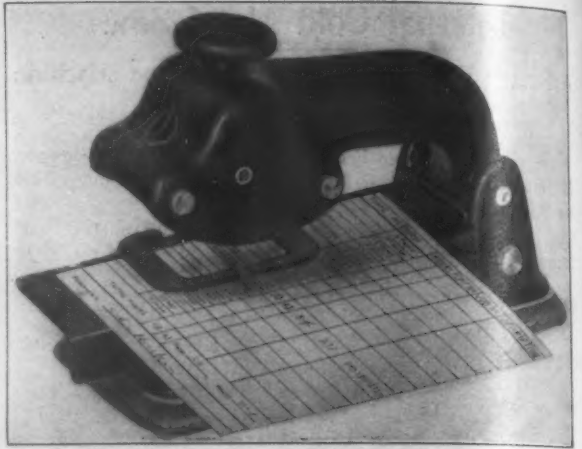


Fig. 2.—The Model No. 4 Chronograph Intended for Cost-Keeping Work.

parts, the Chronograph is provided with a stationary gauge so that the employee simply inserts his time card under the indicator, which shows at once just where the registration is being made. This instrument prints in plain legible type the month, the date, the meridian, the hour and the minute. As the records are registered one above the other, the computation of elapsed time is a comparatively simple proposition. The Chronograph will register in minutes or in tenths or hundredths of an hour as may be desired. These instruments are made in two styles for recording costs, one for use with an individual job ticket and the other where a single daily time ticket for a workman handling a number of different jobs during the day is employed.

Where the daily time card is used the recorder is equipped with a non-adjustable gauge and is illustrated in Fig. 2. With this type the card is shifted by the workman to the proper place for registry and the indicator shows plainly just where the registration is being made. The card is slipped under the indicator and the correct position for printing "started" or "finished" is shown. For the individual job ticket the model No. 3 Chronograph illustrated in Fig. 3 is used. This type has an adjustable gauge insuring the record being stamped upon the card in the proper place. All the operator has to do is to see the gauge is set to print in the correct place, insert the card in the chute and register the time.

In addition to these uses the Chronograph is adaptable for work in an office where correspondence, orders and other similar matter must pass through various hands and it is essential that the time they are received by each person be recorded on them to guard against delays or to locate delays when they do occur. When employed in this way any desired inscription can be placed upon the printing plate. The entire printing line is automatic with the exception of the month, which is changed in about a second by a key. The impression is made through a ribbon, which, like those on the other models, moves and reverses automatically and will print from 150,000 to 250,000 impressions without change.



Fig. 3.—Another Type, the No. 3 Machine; for Keeping Track of Labor Costs.

Typical Installations

Some of the installations of the Chronograph include the main office of the Western Union Telegraph Company, Chicago, Ill., where a recorder is used on the receiving clerk's desk to stamp the time every telegram handed in for transmission is received. This service requires between 3000 and 4000 impressions per day. The recorder installed in the parcel room of the Union Station at Chicago, Ill., probably receives as severe service as any instrument in use. This station is used by four of the largest railroads entering that city and it is no uncommon thing to check between 3000 and 4000 parcels every day, and in checking each of them the Chronograph is used four times, twice when the check is delivered, and twice when it is returned. The in-and-out model is used in one of the navy yards where 50 instruments distributed over a distance of $1\frac{1}{2}$ miles are employed, all being run from one centrally located master clock. Another installation is in the factory of one of the largest automobile concerns in the country, where there are 25 recorders covering a distance of more than $\frac{1}{2}$ mile. This instrument is also used by the Commonwealth Edison Company, Chicago, Ill., for keeping a record of documents passing from one department to another.

An Exceptionally Large Tank Car

A successful solution of the problem of the safe conveyance of liquid commodities in large volumes has been apparently discovered by the Chicago Steel Car Company, Chicago, Ill., in the construction of what is claimed to be the largest oil tank car ever built. The car is built strictly in accordance with the latest safety appliance standards and its construction is along original lines. These are a marked departure from the present accepted standards and combine simplicity and a minimum number of parts in such a way as to insure durability and low maintenance cost. The capacity of this car is 14,650 gal. but on account of the novel design an ordinary 50-ton M. C. B. truck is able to support the structure and the load. A casual examination of the car does not reveal its extraordinary size, the height being only a few inches more than the standard 8000-gal. car, while the over-all length has not been increased to any great extent.

One of the special features of the car is the light weight for the great capacity, practically 72 per cent. of the gross weight being paying freight. The center of gravity of the car is low, which enables it to ride easily on rough and uneven track. It is estimated that the car will withstand a buffing force greater than that which any other car is capable of resisting. The heavy bottom sheet receiving the major portion of the impact has a sectional area of more than double the M. C. B. requirements for an underframe car and lies far below the line of draft. The front section of this sheet, which acts as a tension member to the section between the body bolsters, has a special arrangement of rivets so that those which hold the bottom center sheet to the body bolster and receive the main buffing shock are protected from the contents of the tank so that if any rivets work loose they cannot produce leakage at this point. Another advantage of the increased capacity without a material increase in the over-all dimensions is that the switching charges, cost of repairs, and track room in congested terminals and sidings are reduced approximately one-half.

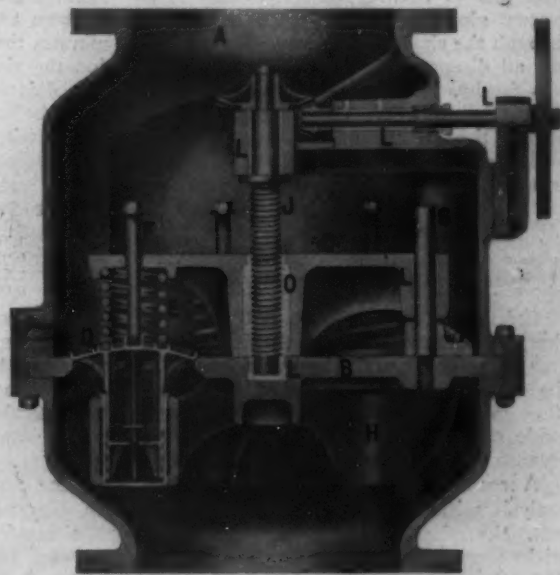
Work has begun on the addition to the power plant of the Ontario Power Company, located underneath the bank of the river, at the foot of the falls, Niagara Falls, Ont., to provide for the installation of two additional turbine generators of 12,500 h.p. capacity each. The completion of these extra generating units will bring the total capacity of the plant up to 148,000 h.p.

The Panama Canal, according to the annual report of the Isthmian Canal Commission, has so far received appropriations from Congress aggregating \$293,561,486, these appropriations leaving \$81,639,531 of the estimated cost of the canal yet to be provided for. The famous Culebra cut, which is 10 miles long, is three-fourths completed. The mechanical problems connected with the work of construction are discussed in considerable detail.

Notable Departure in Relief Valves

A notable departure in relief valve construction for use with steam-heating systems and with steam prime movers operated condensing has been made by the Harrison Safety Boiler Works, North Philadelphia Station, Philadelphia, Pa. The valve, an idea of the construction of which may be gained by the accompanying illustration, consists of a valve deck, on which are placed a multitude of small valve disks, each small disk having a spring to keep it closed; a water cushion or dash-pot to arrest the motion of the disk and to prevent damage to it or its seat; and a stem by means of which the valve disks may be lifted free of the seat when desired. The tension of the spring is determined by the position of the pressure plate shown, adjustable by means of a vertical screw. This may be turned one way or the other by means of bevel gears connected with a horizontal shaft which extends to the exterior of the valve casing as indicated.

The design and development of the valve has progressed in intimate relation to the engineering or physics of the flow of vapor through openings and orifices. The design of the present valve, for example, is to eliminate the necessity of depending upon the force of the impulse of an escaping jet of steam to hold the valve open to the proper amount. The valve disks and the lining of the dash-pots are of bronze, and this fact, together with their large number, is naturally regarded as practically elimi-



Harrison Multiport Safety Exhaust Outlet Valve.

nating the probability of sticking. It is also emphasized that the effective discharge area through the use of the small disks represents a large gain. The individual disks are small and light and have only a small lift, and are held to their seats by springs instead of weights. The total mass in motion is thus comparatively small, with quick responses and little force in striking the seat. By the use of the dash-pot, the seating of the disk is retarded by cushions of water, which are, of course, automatically kept filled through the condensation of steam.

Some of the uses of the pressure plate should also be emphasized. By lifting or lowering it in the manner indicated, the tension of the spring acting on each disk may be changed at will and the back pressure can be adjusted without requiring the shifting of weights on a lever as in the ordinary case. When the valve is to be used for a vacuum heating service, lighter springs are ordinarily employed and provision is made for a water seal. The valve is known as the Cochrane Multiport Safety Exhaust Outlet Valve.

The Craig Foundry Company, which recently secured the Bucyrus Foundry, Bucyrus, Ohio, has placed the plant in operation, doing a general foundry business but making a specialty of hot air registers for furnace heating and radiators for hot water and steam heating.

Carborundum for Special Steels

Results of Its Use for the Raising of the Silicon Content and for Adding Chromium to the Steel

In the *Revue de Metallurgie* for September, 1911, is a long paper on the above subject by Dr. L. Baraduc-Muller. It gives the results of his very interesting experiments in the basic open-hearth plant of Ougrée-Marihaye in Belgium.

Following the first laboratory tests, the first trial was made on a 15-ton heat, the final composition aimed at being 0.50 per cent. carbon and 0.50 per cent. silicon. Briquettes were made from the following mixture, measuring about 8.7 x 4.3 x 2 in. The total weight added was about 400 kg. (882 lb.).

Carborundum, 94.5 per cent. pure.....	141.0 parts
Red oxide of iron, 95 per cent.....	214.0 parts
Carbon, 94 per cent. pure.....	14.8 parts
Lime.....	8.5 parts
Anhydrous silicate of soda.....	6.0 parts
	384.3 parts

The bricks, dry but not heated, were charged into the furnace before tapping. They floated in the slag, about two-thirds of their thickness being submerged. They did not break up, notwithstanding the great change in temperature. Their upper surface was soon covered with little jets of burning carbon monoxide and small incandescent globules of metal formed that trickled down and through the slag. After being charged for 22 minutes they had all disappeared. At the end of the reaction the slag was frothy. When casting the steel, the ingots did not show much silicon. The analyses of a test taken before adding the bricks and an average of three tests taken while pouring are given below. The increase of silicon is not 10 per cent. of that hoped for.

	1st Test	2d Test
Carbon.....	0.44	0.54
Manganese.....	0.766	1.19
Sulphur.....	0.059	0.059
Phosphorus.....	0.064	0.064
Silicon.....	0.018	0.051

Calculation shows that only 8.1 per cent. of the silicon charged has entered the steel, after allowing for a normal loss of 30 per cent. The great loss is brought about by the silicide of iron produced trickling in small drops through a basic slag, which also contains considerable oxide of iron. The bricks are also evidently too large, because of the long time it takes for their melting.

A second test was made on a 15-ton heat, the final analysis wished for being 0.2 per cent. silicon, 0.25 per cent. chromium and 0.45 per cent. carbon. Forty-five bricks were taken of the same size as before, but each one was cut into four parts. The total weight was about 251 lb. (114 kg.). The mixture used was:

Carborundum, 94.5 per cent. pure.....	23.7 parts
Sesquioxide of chromium, 98 per cent. pure.....	60.6 parts
Carbon, 94 per cent. pure.....	7.3 parts
Lime.....	1.2 parts
Anhydrous silicate of soda.....	3.0 parts
	96.8 parts

These briquettes were charged as before, and had all disappeared in 15 minutes. The slag was slightly foamy. The chief point of interest was to see how much chromium would be introduced. A tapping test gave 0.02 per cent. silicon, and the final steel gave:

Carbon.....	0.450 per cent.
Sulphur.....	0.064 per cent.
Phosphorus.....	0.027 per cent.
Manganese.....	0.630 per cent.
Silicon.....	0.225 per cent.
Chromium.....	0.220 per cent.

The result was therefore very satisfactory. Allowing for a normal loss of 30 per cent., calculation shows that 93.7 per cent. of the chromium charged has entered the steel. The high silicon in the steel was obtained by the use of ferrosilicon.

Further tests were made with practical considerations in mind. In order to obtain silicon, it was evidently necessary to add the mixture either in the tapping spout or the ladle. This made necessary a speed of reaction such as would be complete before the slag came. The minerals and other materials to be used were crushed very finely, thoroughly mixed, and thin cakes made about 4.3 x 0.98 x 0.39 in. The proper weight of cakes was placed in a conical

heap at the bottom of the ladle, in such position that the jet of steel would strike it. The first test under the new conditions was made on a 15-ton heat, the final analysis wished for being 0.6 per cent. carbon and 0.25 per cent. silicon. About 550 lb. (250 kg.) of the following mixture was used:

Roll scale.....	100 parts
Carborundum, 94.5 per cent. pure.....	53.3 parts
Carbon, 90 per cent. pure.....	4.5 parts
Cement.....	10.0 parts
Silicate of soda.....	3.0 parts
	170.8 parts

The analysis of the roll scale gave:

Fe ₂ O ₃	65.10 per cent.
FeO.....	26.20 per cent.
Fe.....	5.30 per cent.
Mn.....	0.60 per cent.
SiO ₂	1.60 per cent.
Not determined.....	0.50 per cent.
	99.30 per cent.

The cakes were previously heated in a small reverberatory furnace, and were probably at 600 deg. C. when the steel fell on them. (It was hoped that this would be hot enough.) This was done as a precaution, for all that the steel had to do was to heat them to 1350 deg. C. The reaction would then commence and being slightly exothermic would have no tendency to chill the steel and make a skull in the ladle. Very few cakes floated to the surface of the metal and the reaction was apparently over in 1 min. 23 sec. The results of a final furnace test and of a ladle test were as follows:

	Furnace Test Per cent.	Ladle Test Per cent.
Carbon.....	0.62	0.65
Sulphur.....	0.030	0.030
Phosphorus.....	0.023	0.023
Manganese.....	0.650	0.650
Silicon.....	0.018	0.169

Calculation shows that 66 per cent. of the silicon available has been taken up by the steel, after allowing for a normal loss of 30 per cent. This is considerably better than before, but it is not yet entirely satisfactory.

A second experiment was made with the small cakes, except that they were not heated before using, and after allowing for the normal loss, only 47 per cent. of the silicon in the mixture entered the steel. Tests also showed that the silicon was not uniformly distributed in the ladle of steel, the part poured the last being much higher in silicon than the first. This would indicate that not enough time was available for the reaction, and the tests also show that the silicon is produced toward the top of the ladle and not rapidly and completely at the bottom as it should be.

The next experiment was made on a 15-ton heat which was desired to be 0.45 per cent. carbon, 0.25 per cent. chromium and 0.2 per cent. silicon. The little cakes were made of the following mixture:

Chromite.....	93.5 parts
Carborundum, 94.5 per cent. pure.....	32.6 parts
Carbon, 90 per cent. pure.....	6.0 parts
Silica, 95.0 per cent. pure.....	10.5 parts
Cement.....	7.0 parts
Silicate of soda.....	3.0 parts
	153.4 parts

The silica was added to make a slag with the lime, magnesia and alumina of the chromite, that would melt between 1350 and 1380 deg. C. The chromite contained 58.8 per cent. Cr₂O₃, 18.8 per cent. FeO, 8.7 per cent. Fe₂O₃, 10.2 per cent. MgO, 1.16 per cent. CaO and 2.46 per cent. SiO₂. About 595 lb. (270 kg.) of the mixture was put in the bottom of the ladle. The steel was poured hotter than usual, and the reaction was over in 1 min. 40 sec. The analyses of the final tapping test and of an average of three tests taken while pouring the steel into ingots were as follows:

	Furnace Test.	Ladle Test.
Carbon.....	0.39	0.48
Sulphur.....	0.058	0.058
Phosphorus.....	0.019	0.034
Manganese.....	0.745	0.734
Silicon.....	0.0094	0.136
Chromium.....	0.0094	0.196

The three ladle tests showed a very uniform material. Calculations show that 65.4 per cent. of the silicon and 85.3 per cent. of the chromium entered the steel, after allowing for the normal loss. The aim of the experiment was to find out if natural oxides could be used with the carborundum.

The experiment tried with the next heat was to see whether chromium alone could be introduced and no silicon. In other words it was hoped that both the carbon and silicon of the carborundum would reduce chromium. The addition was made in the furnace as the basic slag could not affect the silicon of the mixture, and the usual amounts of ferrosilicon were added in the furnace and ladle. The 15-ton heat was desired to finish 0.50 per cent. carbon, 0.20 per cent. silicon and 0.25 per cent. chromium. The mixture was made into bricks about 8.7 x 4.3 x 2 in., which were cut into three parts. They were composed of:

Chromite, with 58.8 per cent. Cr.....	100 parts
Carborundum, 94.5 per cent. pure.....	20.2 parts
Cement	12 parts
Silicate of soda.....	3.5 parts
	135.7 parts

Ten minutes before tapping about 397 lb. (180 kg.) of the briquettes was charged, after taking the last furnace test. The reaction was over in 7 min. 35 sec. The slag was a little frothy and the casting temperature was normal. The analyses were as follows:

	Furnace test	Ladle test
Carbon	0.51	0.53
Sulphur	0.050	0.050
Phosphorus	0.049	0.050
Manganese	0.648	0.609
Silicon	0.028	0.136
Chromium		0.200

The ladle test result is the average obtained on three samples taken at the beginning, middle and end of pouring. They agreed very closely, showing good uniformity. After allowing for normal loss it is found that 79.3 per cent. of the chromium was obtained. The amount of ferrosilicon added was unfortunately forgotten so no calculations could be made in regard to silicon.

Many pages are then devoted to the question of the comparative cost of the carborundum method, and the use of ferrosilicon and ferrochromium for adding the required chromium and silicon to the steel. Under the conditions existing in Belgium the addition of silicon alone by this method is not so cheap as the use of ferrosilicon. When chromium and silicon are to be added, however, the saving in cost varies from 23.3 per cent. to 45.5 per cent. Laboratory tests show that nickel-chromium steels can be also made by this method, and it would be interesting to see what results would follow the use of mixtures of carborundum with tungsten, molybdenum and vanadium minerals.

As a consequence of the experiments outlined above the method has been adopted by the Ougrée-Marihay works.

G. D. W.

The Gardner Ring Wheel Chuck

For use on all types of disk, vertical, edge, face and knife grinders, the Gardner Machine Company, Beloit, Wis., has recently placed on the market a new type of ring wheel chuck. Some of the special features claimed for the chuck are lightness, simplicity of construction, perfect running balance, a minimum overhang and safety in operation. A view of the chuck is given in Fig. 1, while Fig. 2 illustrates some details of its construction, being an end view and an axial section.

The chuck body or shell *a*, Fig. 2, is a one-piece steel casting that is machine finished all over. The outside or clamping ring *b* is a special steel forging also machine finished, threaded, and having a taper seat for contracting the periphery of the chuck body. It is pointed out that further strength is added to the chuck by this ring, which is prevented from turning by the locking screw *c*. The outside of the chuck body is tapered and threaded to conform to that in the clamping ring, and this portion of the chuck body is slotted in a number of places so that the clamping ring acts on the principle of a spring collet, gripping the abrasive ring *c* solidly and evenly at all points. A simple spanner wrench is the only tool that is required for this operation and it is emphasized that in this way the danger of breaking the abrasive ring due to hasty adjust-

ment of the drawback screws sometimes employed for this purpose is eliminated.

When a new abrasive ring is placed in the chuck it extends 1 in. beyond the face of the chuck body. As the ring becomes worn it is removed and the short backing plugs *d* put in place. The abrasive ring is then replaced in the chuck and worn down to the body a second time. Then it can be removed and a longer set of plugs inserted as two sets are furnished with each chuck. In this way it is possible to use a ring which has been worn down to a thickness of 1 in., which is the minimum thickness sanctioned by good practice and considerations of safety.

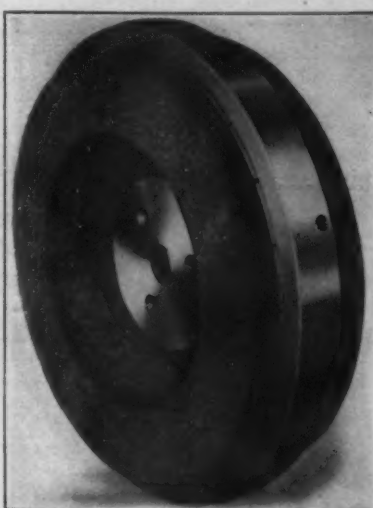


Fig. 1—A New Type of Ring Wheel Chuck for Grinding Machinery Made by the Gardner Machine Company, Beloit, Wis.

ment of the drawback screws sometimes employed for this purpose is eliminated.

To reduce the overhang to a minimum, the chuck body is recessed in back. If desired center holes of various sizes can be drilled to fit these chucks to arbors and

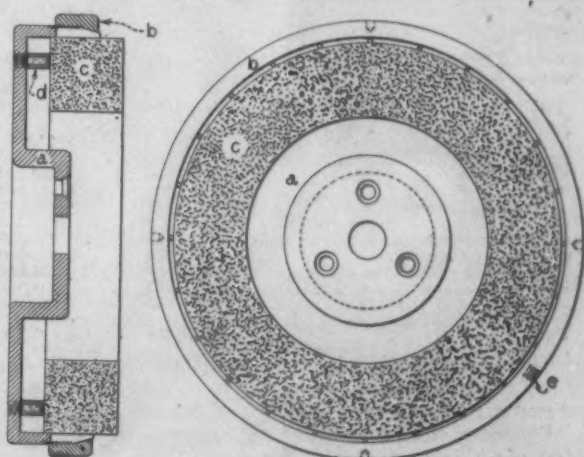


Fig. 2.—Details of the Chuck.

spindles of various sizes and types of grinding machines. Six sizes of chucks for mounting abrasive rings from 12 in. to 24 in. in diameter are made, and these chucks can be interchanged with the disk wheels of any disk grinder easily.

The Knox Pressed & Welded Steel Company

Steel plate makers are said to be taking much interest in the business of the Knox Pressed & Welded Steel Company, Niles, Ohio, manufacturer of water-cooling devices for open-hearth furnaces. In the past such equipment was wholly made from castings. Luther L. Knox, vice-president of the company, has perfected and patented doors and frames for open-hearth furnaces composed of steel plates, cut to size, fitted and welded together to hold the circulating water. Steel manufacturers who have tried the new type of doors and frames have placed orders for others. The new and increased business of the Knox Company helps to enlarge the consumption of steel plates. In a recent week the company was awarded contracts for its equipment for six plants, located in different sections of the country. It has bids out for the installation of the necessary devices for an entire plant, and expects to secure the order. It also has on its books contracts for pressed, welded and riveted steel work, its equipment, which was described in a recent issue of *The Iron Age*, being well adapted to anything of this character.

The Colorado Fuel & Iron Company

Report for the Year Ended June 30, 1911.

The report of the Colorado Fuel & Iron Company, covering operations for the fiscal year ended June 30, 1911, shows the following earnings as compared with the previous year:

	1910-11.	1909-10.
Gross earnings:		
Iron department.....	\$13,775,664	\$13,604,832
Industrial department (fuel).....	9,159,021	10,034,981
Total gross earnings.....	\$22,934,685	\$23,639,813
Net earnings:		
Iron department.....	\$2,502,566	\$2,492,136
Industrial department (fuel).....	975,783	1,250,479
Total net earnings.....	\$3,478,349	\$3,742,615
Add—income from securities.....	535,672	499,080
Interest and exchange.....	135,927	127,840
Total net income.....	\$4,149,948	\$4,369,535
Deduct:		
Bond interest.....	\$2,091,610	\$2,097,692
Taxes.....	214,785	218,765
Real estate.....	151,263	171,458
Insurance, sociological, personal injury, etc.....	233,602	154,908
Equipment renewal.....	128,106	164,945
Loss on Col. & Wyo. Railroad.....	10,005
Loss on Crystal River Railroad.....	36,000	36,000
Prospecting.....	24,904	18,948
Total deductions.....	\$2,890,276	\$2,862,716
Balance, surplus.....	\$1,259,672	\$1,506,819

The balance sheet of the Colorado Fuel & Iron Company as of June 30 compares as follows:

	1910-1911.	1909-1910.
Assets.		
Properties and securities.....	\$15,742,701	\$15,711,875
Equipment.....	27,078,135	27,053,647
Cash on hand.....	3,590,120	2,426,254
Stocks and bonds.....	6,215,220	6,056,719
Accounts and bills receivable.....	3,306,639	3,579,295
Subsidiary companies.....	2,586,331	2,255,929
Manufactured stocks, etc.....	3,175,304	3,368,918
Stripping, etc.....	328,785	355,141
Accrued dividends and interest.....	78,576	154,096
Miscellaneous.....	152,195	144,352
Total.....	\$62,254,006	\$61,106,226
Liabilities.		
Common stock.....	\$34,235,500	\$34,235,500
Preferred stock.....	2,000,000	2,000,000
Funded debt.....	20,816,000	20,822,000
Accounts and bills payable.....	889,245	1,025,746
Hospital.....	8,558	2,730
Accrued bond interest.....	857,515	858,130
Tax payment fund.....	100,000	100,000
Sinking fund—real estate.....	932,124	873,634
Miscellaneous funds.....	177,912	204,932
Profit and loss.....	2,237,152	983,554
Total.....	\$62,254,006	\$61,106,226

The consolidated balance sheet of the company and all its subsidiaries shows total assets of \$102,832,608, with an excess of assets over liabilities of \$21,346,159.

Following is a statement of production in the past three fiscal years, in tons of 2000 lb.:

	1910-11.	1909-10.	1908-09.
Coal.....	4,233,756	4,722,832	4,094,352
Coke.....	753,192	905,599	645,545
Iron ore.....	841,699	879,630	580,784
Limestone.....	425,704	407,517	363,975
Pig iron.....	397,701	385,602	295,534
Finished iron and steel.....	424,421	412,749	359,793

President J. F. Welborn makes the following accompanying statement:

"The year commenced with promise of better coal business than had previously been enjoyed by the company, but an unusually mild winter and the extreme drought in the agricultural states west of the Missouri River during the season of 1911 caused a lighter demand for Colorado domestic coal in the first half of that calendar year than has been known in a similar period in the last decade, with the result that our coal production fell off 489,076 tons, and earnings from fuel sales decreased \$274,696. This decrease in earnings would have been overcome by the more efficient management that ruled in both producing and selling divisions of the fuel department, but for the disastrous coal mine explosions that occurred in January, 1910, and October, 1910, most of the expense of which was borne by last year's business, and all of which had been paid and charged to operating expenses prior to July 1, 1911.

"The iron department shows an increase of \$170,832 in gross and \$10,430 in net earnings, with prices on all products except rails much lower than for many years. Had the higher prices of the previous year been secured, the net earnings from the sale of iron and steel would have shown an increase of at least \$250,000, due to lower costs

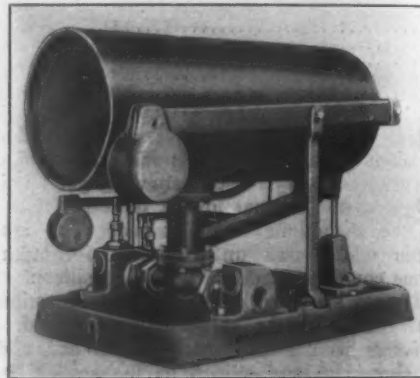
of ore and steel; or, with selling prices that obtained prior to the panic of 1907, an additional \$1,000,000 would have been earned.

"Had we escaped the two coal mine explosions, and in other respects experienced as favorable conditions as during the previous year, the surplus might well have been \$2,000,000. It may, therefore, be said that considering the unfavorable conditions, which the management could neither have foreseen nor prevented the results from the year's operations were more favorable than in any previous year of the company's history.

"The expenditures for maintenance have been on a liberal a basis as heretofore, and the physical condition of the property has been improved during the year."

The Detroit Return Trap

For automatically returning condensation to boilers without pumping in steam systems used for either heating or power and also where the water is used for boiler feed purposes, the American Blower Company, Detroit, Mich., has brought out a new type of its Detroit tilting return steam trap. No new principles have been adopted in the construction of this trap as compared with others, but several improvements in design and construction are embodied which it is claimed make the new trap superior in



The Detroit Tilting Return Trap Made by the American Blower Company, Detroit, Mich.

several important features of the one that it supersedes. Simplicity in construction and durability are two important features of the trap.

The trap consists of a steel tank swung on a trunnion between two supports, which consist of a valve connection on one side and a water connection on the other. The water of condensation is admitted and discharged at the water end of the trunnion, while the valve end is where the live steam is admitted. The photograph from which the accompanying engraving was reproduced was taken looking at the water side of the trap. A weighted lever normally maintains the tank in a horizontal position, as is the case with other tilting traps. When enough water has entered the condensation tank to overcome the weight of the counterbalance the tank tilts downward and automatically opens the lever-actuated steam and relief valves. This admits steam at boiler pressure above the water of condensation in the tank, thus equalizing the pressure in the tank and boiler and causing the water to flow back by gravity from the tank to the boiler.

The steam valves are of the iron body type with brass mountings and have renewable seats and disks. As the valve disks are standard and are readily renewable and interchangeable they can be replaced at small expense by a plumber or steam fitter. Another important feature in the construction of the trap is the use of flanged semi-steel castings similar to those used in high pressure power and heating practice instead of screwed pipe fittings. The relief valve is made an integral part of the trunnion bearing, thus doing away with flexible tubing for the discharge and other movable attachments. The counterbalance weight is placed on the side of the tank instead of above it, thus giving additional head room above the boiler. A screw adjustment in connection with the lever that actuates the relief valve enables the size of the opening to be varied to suit the operating conditions best, depending on whether the system is running on high or low pressure.

A novel bumper cushioning device is employed in which only one compression spring is required. It is claimed that this device has eliminated much of the noise caused by the rocking of the tank. A solid gas welded tank is used and is galvanized after being welded. The trap is mounted on a new type of base, having rolled edges to form a drip pan with a bleeder tapping and large enough to cover all of the fittings.

In operation the trap, which is made in seven sizes, ranging from 10 to 800 hp., is installed level with the pipe connections at a minimum distance above the water level in the boiler of 4 ft. The water supply and discharge are controlled by swinging check valves in the inlet and discharge pipes.

Mechanical Engineers' Annual Meeting

The annual meeting of the American Society of Mechanical Engineers will be held as usual in the Engineering Societies Building, New York. The opening session is scheduled for Tuesday, December 5, and the closing session will occur Friday, December 8. The programme of the meeting has not yet been issued, but one session is to be devoted to foundry practice, another to steam boiler performance, and the gas power section will have a session. At this, oil engines, at present a subject of importance, will be discussed. The president's reception will occur Tuesday evening in the rooms of the society, George J. Foran in charge as chairman of the sub-committee. The annual reunion will take place at the Hotel Astor on Thursday evening, and F. A. Scheffler is chairman of the sub-committee for that occasion. As usual, luncheon will be served on Wednesday and Thursday during the convention. Among the excursions planned is one to inspect the steamship Olympic. There will also be trips to the Brooklyn Navy Yard, the Sims Magneto Company in Bloomfield, N. J., the Bush terminal buildings in Brooklyn, the E. W. Bliss Company, Brooklyn.

The Power Specialty Company, 111 Broadway, New York, reports that among recent contracts received for Foster superheaters are the following: New York, New Haven & Hartford Railroad, at Cos Cob and Bridgeport plants, 10,620 hp. in Bigelow-Hornsby and Babcock & Wilcox boilers; Delaware, Lackawanna & Western Railroad, at Loomis Colliery, 900 hp. in Erie City boilers; International Harvester Company, at Plano and Weber plants, 2800 hp. in Edge Moor boilers; Associated Pipe Lines, 3000 hp. in Edge Moor boilers; Haskell-Barker Car Company, 3200 hp. in McNaul and Babcock & Wilcox boilers; J. R. Nutt, Ft. Worth, Texas, 4000 hp. in Edge Moor boilers; Clark Thread Company, 1000 hp. in Stirling boilers; Indiana & Michigan Traction Company, 3200 hp.

Hauck Changeable Forge

Brazing operations and preheating cast iron, brass and other metals are the special fields intended to be covered by a patent changeable forge developed by the Hauck Mfg. Company, 140 Livingston street, Brooklyn, N. Y. These forges use kerosene as fuel and are designed for machine and repair shops. Fig. 1 is a view of the forge arranged for brazing, while Fig. 2 shows the changes made in the arrangement of the tiles for the performing of various other operations. From left to right of Fig. 2 the op-



Fig. 1.—The New Changeable Forge Built by the Hauck Mfg. Company, Brooklyn, N. Y.

erations are heating soldering irons; melting brass, aluminum and other metals in crucibles; melting soft metals; dressing and tempering tools and blacksmithing and annealing.

While in a large establishment separate forges are used for each of the foregoing heating operations as a general thing, to meet the requirement of the average repair shop, the changeable forge has been developed. The changes

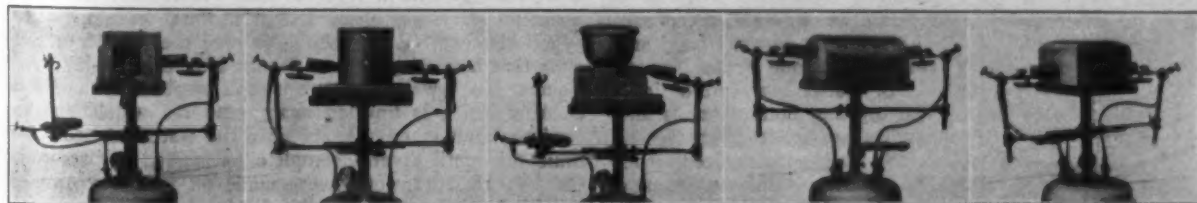


Fig. 2.—Views of the Forge Arranged for Different Operations.

in Wickes boilers; Wilmington & Philadelphia Traction Company, 2400 hp. in Edge Moor boilers; Penn Central Light & Power Company, 2400 hp. in Edge Moor boilers; Citizens Light & Power Company, Montgomery, Ala., 3200 hp. in Stirling boilers.

A conference on car wheels was held in New York on November 10, at the Waldorf-Astoria Hotel, and the following were among those representing the Master Car Builders' Association: W. Garstang, superintendent of motor power, Big Four Railroad, Indianapolis, Ind.; C. A. Brandt, mechanical engineer, Big Four Railroad, Indianapolis; R. L. Ettenger, consulting mechanical engineer, Southern Railroad, Washington, D. C.; J. M. Henry, master mechanic, Pennsylvania Railroad, Sunbury, Pa.

necessary in the furnace to enable it to perform the different classes of work requiring heat treatment can be made very quickly. The forge or brazing table, as will be seen by referring to Fig. 1, consists of a 12-gal. seamless tank with a hand pump placed inside, two burners connected with hose and mounted on brackets so that their position can be changed instantly, a table extending from the top of the tank lined with fire brick tiles and four extra tiles to meet the requirements of ordinary repair shops.

A saving of from 30 to 50 per cent. or more over gasoline, gas or coal fires is claimed for the new forge. One gallon of kerosene contains approximately 116,000 B.t.u. or approximately 28 per cent. more than is contained in the same quantity of gasoline. In addition to this increase in the number of heat units available, other advantages are the absence of smoke and gases produced with other fuels as well as the absence of ashes.

Time Study Observations

Different Methods of Discovering Faults in Machine Operation and Manual Labor

BY N. E. ADAMSON, JR.

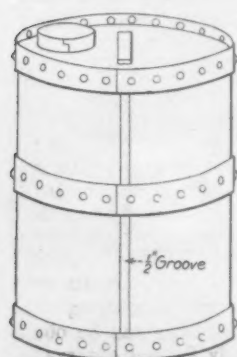
The numerous recent magazine articles and books dealing with the subject of "Time Study" have been filled with data showing benefits derived through the application of scientific management, and have described fully the principles observed in the installation and maintenance of scientific methods in various industries. Little has been written, that describes definitely the proper procedure to obtain a correct, and therefore useful, observation of a process, which observation is the basis of any system of scientific investigation. By the term observation is meant a written record of a definite process as it occurs in practice. All writers advocate the use of a stop watch to determine the duration of each elementary movement, but my experience has taught that "the use of a stop watch" is a broad term, and unless it is used scientifically it is of little value.

When entering a shop to make observations I carry with me a stop watch which has an hour hand, a minute hand, a second hand, a sweep-hand and a small hand showing the number of minutes since the sweep hand was started. I also carry a revolution counter, a counting machine about the size of a watch and a note book. The counting machine may seem quite unnecessary to some who are not acquainted with the frequent interferences that occur while attempting to count operations which are taking place several yards away. One's attention is often taken from these operations, and the mind is apt to forget the count, but the counting machine does not forget and thus time is saved by not having to repeat the observation.

In discussing this subject I shall confine my remarks to observations in manufacturing articles, and will not enter the field of repair work, where the scarcity of useful information is deplorable. The first logical division of observations is

1. Short observations.
2. Long observations.

Short observations include all those covering operations requiring for performance $\frac{1}{2}$ hr. or less. A good field for short observations occurs in the manufacture of 10-gal. paint drums. It has been the writer's privilege to observe the manufacture of these drums and to study in detail the various stages of their production. The cut shows the type of drum. It is $20\frac{1}{2}$ in. high and $13\frac{3}{4}$ in. in diameter. The opening at the top is fitted with a circular collar, to receive a wooden plug to be driven in, and a tin disk is soldered over the plug, thus making an air-tight receptacle. The top, bottom, centerband and collar are made from No. 20 U. S. gauge galvanized iron. The top and bottom bands and handles are made from No. 14 U. S. gauge galvanized iron. No. 11 wire is inserted around the edge of the collar.



The Object in the Time Study Observations.

As this drum is manufactured by the thousand, it is quite essential that a minimum cost should be realized. With this object in view, the first step of standardizing its manufacture was made in April, 1911.

At that time the direct labor cost per drum was \$0.466. There is no operation in the manufacture of this drum which requires more than one-half hour for performance, and therefore all observations of its manufacture will be in the first division as given above.

The first observations were for the information of the shop superintendent to give him a general idea of the various operations and their costs. They were observations of type a, as follows:

Type (a) Record starting and stopping time and the number of complete operations performed by the employee during that time. Also record the working speed

of the machine, its inventory number, the name, rate and pay of the operator. From these data can be determined the average cost of one operation and the average output per hour.

On April 26, 1911, I recorded that Mr. Jackson, third class galvanized iron worker, \$2.64 per diem, was punching end bands in machine No. 156-38, which is a gang punch.

Started observation 1:30:00 p. m.
Stopped observation 2:30:00 p. m.
Number of bands punched, 251.

After returning to the office I added to the record the following: Time 1 hr.; average output per hour, 251; average direct labor cost per band, \$0.001375.

This information was all right for the purpose intended. The operator had remained at his work during the entire time. Apparently it was just to both the employer and the operator to say that 251 was a fair standard output per hour because every moment of this time had been used to punch bands. But I did not record the consecutive movements necessary to punch a band, and, therefore, the observation is worthless when it comes to determining what the actual waste of time was. I failed to record the position of the supply of bands relative to the working position of the operator. Probably a pile of them had been placed behind him so that it was necessary to turn around in order to pick up each band before putting it in the machine. Such conditions are not unusual. If the time to

Exhibit A—Record of Type b Observations.

July 18, 1911.

Soldering around collars and rivets of handles.
Mr. James, second class galvanized iron worker, \$3.04 per diem.
(Type a) Soldering 5 tops in 10 min, 31 sec.
1. Throwing aside completed top and picking up a top to be soldered..... 8 121 332
2. Fluxing 22 133 237 347
3. Soldering 110 219 325 437

punch a band seems excessive, there are no data from which we can determine what the time should be. Sometimes this difficulty is sidestepped by saying offhand that the output should be 50 per cent. more than 251 and thus setting the standard output at 376. Such standards are of little value, and the manager who permits such practice has missed, by a large margin, the common sense principles of scientific shop management.

Type (b). Watch the operator for a short while. Analyze the whole operation into its parts or elements. Write down the elements in order of their occurrence. When the operator starts on element No. 1 start the stop watch. When element No. 1 is complete read the number of seconds that have elapsed, but do not stop the watch. After element No. 1 write the time it took to perform it. When element No. 2 is finished again read the watch, and record the number of seconds since the watch started. Continue this until several complete operations are recorded. On July 18, 1911, notes were made on an observation of this kind, as shown in Exhibit A.

The observation card contained data when the above information had been recorded thereon as shown in Exhibit B. The description of the method used by the operator is written on the back of the card. It is as follows: Method: The tops to be soldered were piled to the right of

Exhibit B—Type b Observations as Recorded on Shop Observation Card.

Character of work: Soldering around collars and rivets of handles—Manufacture of 10-gal. paint drums.
Workman, Mr. James, \$3.04 per diem.

Operation.	Description of Operation.	Sec.	Sec.	Sec.	Sec.	Average
A—	Throwing aside finished top and picking up another top.....	8	11	26	7	8%
B—	Fluxing	14	12	15	15	13%
C—	Soldering	88	96	88	90	90%

Total average..... 112%

Average of 5 tops, type a observation = 126.2 sec.

Direct labor cost per top = \$0.0133.

Standard output per hour = 28.

Standard cost = \$0.01485.

Remarks: Tops were piled under bench, thus making it difficult for operator to reach them.

the operator beneath the bench at which he worked. The forge was behind him and slightly to his right. The acid was on the bench directly in front of operator. After completing, the top was dropped beneath the bench to operator's left.

What does this card show? Operations B and C seem to be about constant. When working at normal speed their variation should be slight, for they consist of almost identically the same movements. Operation A shows wide fluctuations. Why? Because one time the top was easy to reach and another time the operator had to strain to reach under the bench for a top. The first step in order to standardize this operation is to have the tops placed in a position where they can be most easily reached. By putting them on the bench the duration of the operation would possibly drop to 4 sec. We further notice that the difference between the average of four complete operations when divided into elements and the average of five operations (which is an observation of type a) is 13 1/3 sec. Why? It is but a fulfillment of the above statement that observations of type a do not show where the wastes enter but cover all wastes. During the observance of the five, the operator probably cleaned his irons once or stopped to exchange a word with a fellow workman. At any rate the standard should be set from the observation which is divided into its elements, where all irregularities are plainly shown. In this case the standards are entered with a pencil, for it is the opinion of the time study man that changes will soon be made which will change this standard. The object of letting the watch run throughout the entire duration of several complete operations is to diminish the error due to time lost in stopping, reading and restarting watch.

Differential Type of Observations

There is one feature about this type of observation that is detrimental. Even though one is skilled in the use of a stop watch, there is a lapse of 1/2 to 2 1/2 sec. between the time when one realizes that an elementary movement is complete and another movement has been started and the time when his eyes have been turned from the operator to his watch and the sweep hand located. A constant elementary observation may therefore appear to fluctuate due to an unavoidable error of the observer. This error is eliminated in observations of type c.

Type (c).—The complete operation is divided into its elements. These divisions consist, so far as practicable, of a single motion of the operator. Each motion is given a symbol letter. By properly grouping these motions and by timing each group separately and solving simultaneously the equations obtained, the duration of each element is obtained. Exhibit C shows the notes taken in the shop and Exhibit D relates to the observation card made from the notes.

Here the time for each element is almost constant. There are absolutely no irregularities in the operations which are timed for this record. If the stripper fails to pull the scrap from the punch, if the operator stops to

Exhibit C—Record of Type c Observations.
July 17, 1911.

Punching out collars. Machine, 156-65.
T. N. Jones, \$2.00 per diem.
Type a, 100 collars in 12 min. 53 sec.
a = sliding in for first punch.
b = making first punch.
c = sliding in for second punch.
d = making second punch.
e = knocking out scrap.

	Seconds		
a + b + c + d + e	13%	12	13%
a + b + c + d	11	10	11%
c + a + b + c	8%	7%	7%
d + e + a + b	10	10%	9%
c + d + e + a	8	6%	6%
b + c + d + e	11	9	9%

count the number of pieces punched or if any element occurs which is not in the regular routine, the observation is discarded. In column 4 of Fig. 5 the average of 1, 2 and 3 is recorded. The sum of column 4 in this case, and almost invariably, is greater than the average sum of all the elements as given in the notes. This is due to the fact that an observer in getting the total time of an operation (the first tabular line in the notes) will time from a definite sound until that sound again occurs. In this case, time is recorded from the time of the click of the punch when it makes its first cut until the click is made with the next first cut.

In the following observations there are usually no definite signals for starting and stopping the watch. The

operator will then not start the watch until he is certain that the elementary motion is started. In the effort not to time a complete set of elements, he is often too hasty in stopping the watch. Due to these two tendencies an average error of 0.3 sec. was made on this record. The corrections made use of the following proportion: Total average: observed total:: recorded average elementary time: corrected elementary time.

This type is an improvement on type b. The watch is started and stopped while the observer's eyes are fixed on the operator, and thus the error due to reading the sweep hand while it is in operation is eliminated. By using in connection with this observation an observation of type a, it is possible to determine the efficiency of the operator. This efficiency is based upon the standard as set by observation of type c. The bad features of type c observa-

Exhibit D—Type c Observations as Recorded on Shop Observation Card.

Character of work: Punching out collars on machine 156-65—
Manufacture of 10-gal. paint drums,
Workman, T. N. Jones, \$2.00 per diem.

Operation	Description	Sec.	Sec.	Sec.	Average	Correct
A.	Sliding in for first punch...	2%	3	2%	2.5	2.00
B.	Making first punch.....	5%	5%	6%	5.8	4.16
C.	Sliding in for second punch	3%	1%	3%	2.8	2.00
D.	Making second punch.....	4%	4%	4%	4.66	3.34
E.	Knocking out scrap.....	2%	2	1%	2.07	1.48

Total average..... 12.98

Average time of 50 complete operations = 15.46 sec.

Average time of 100 collars = 7.73 sec.

Direct labor cost per collar = \$.000538.

Standard output per hour = 556.

Standard cost = \$.00045.

Remarks: In one complete operation two collars are made.

tion are: 1, the extra long time required to make an observation; 2, the increased amount of clerical work necessary to make records from the notes. The second defect is partially overcome by using a slide rule.

In my work I use all three types of observations. The nature of the operation determines the type used. When I can divide an operation into its elements, each one of which is so large that one or two seconds is immaterial, I use type b. If the operation consists of a series of distinct elements, one or more of which does not exceed 3 or 4 sec., I use type c. Having set the standard through the use of type b or c, I use a type a observation to determine the efficiency of the operation as performed under present methods. Of course a change in method necessitates a change in standard output and cost. The words "Standard output per hour" and "Standard cost" are written with red ink so as to be quickly found on the card. The "Standard Cost" includes only the cost of the direct labor; i. e., the cost of operator's time for one unit or one complete operation. In event of there being two methods of performing an operation, each method, according to a type b observation, appearing to require the same time for its performance as does the other, I find type c very effective because of the intensity with which it shows up an element foreign to the regular routine of performance.

Long Observations

A long observation is made up of elements which can be subdivided into elements, so that we may consider a long observation as a series of short observations of type a, where the number of units performed in each case is, as a general rule, one. Upon the introduction of time study into any branch of industry, common sense is more desirable than the juggling of theories. More results in the form of dollars saved can be realized by applying to practice the information as it is gathered than can be obtained by accumulating a mass of closely figured observations, and then attempting to enforce the minute changes at the same time when the radical changes are made. In other words: eliminate the gross errors and wastes first; then attack the minute wastes.

Considering this doctrine I began the study of a long process. The observation card is the same as is used for short observations. If one card will not hold all the operations, the observations may be continued on a second card, and, if necessary, on a third card. It is often a good idea to make a rough sketch of the article worked on, so that one will be able to ascertain quickly the nature of the work on glancing at the card. The operation to which I shall refer is a typical one; i. e., the manufacture of a sprinkler ring, which is a part of a stationary fire extinguishing apparatus. An order for six such rings had been issued. By observing the first ones made I was able to

point out definitely where the waste occurred and the cost of each waste. Special attention is invited to the observation of drilling these rings, shown in Exhibit E. Operation A was performed on only one ring, for having once determined the position for the holes, the operator could transfer the marks from the first ring to the subsequent rings. Operation D is itemized on the back of the card as follows:

Observation No. 1:	Wasted Time.	Min.
Looking for leading man.....		7½
Idle waiting for 12 o'clock whistle.....		8½
Getting drill, pneumatic machine, hose, etc., from tool room		14
Other workman attempting to take hose.....		2
Breaking drill		3
Breaking drill		5
Another drill broke as observation closed.		5
Total observed waste, min.....		40
Observation No. 2:		
Going to office for instruction.....		4½
Idle, talking to helper.....		11
Other workman stops to speak.....		1½
Other workman takes away hose (by order of leading man).....		24½
Drill bends, going to tool room for another.....		6½
Total observed waste, min.....		48
Observation No. 3:		
Away from work (idle).....		3½
By leading man, to punch card.....		1½
Total observed waste, min.....		44

During observation No. 1 a Little Giant pneumatic drilling machine was used. It was too heavy for a ¼-in. drill and, as seen, caused excessive breakage. The drills broken had taper shanks. During observations No. 2 and No. 3 the machine was replaced by a small pneumatic buzz breast drill. The drills herein used had straight shanks, thus reducing the loss in case of breakage. The decrease in weight of machine used eliminates the waste due to breaking drills.

From the note it is seen that the operator, when left to select his own tools, was satisfied with a drilling machine which was entirely too heavy for the drill. In case a drill should break with the small machine the cost would be small in comparison with the cost of a taper shank drill. The test referred to in operation E was made to determine whether the holes were properly placed and the drill held at

Exhibit E—Record of Observations of a Long Process.

Character of work: Drilling 1½-in. brass pipe sprinkler rings. Workmen: White, \$3.76 per diem; J. King, pipe fitter and helper, \$2.00 per diem.

Operation	Description of Operations	Min.	Min.	Min.
A.	Setting ring in working position and locating marks	15¾		
B.	Marking off	70	71¾	48¾
C.	Drilling	114½	26¾	31¾
D.	Wasted time (see back of card).....	40	48¾	4¾
E.	Testing	45		

Total time, omitting A and E.....224¼ 146¾ 85
Average time of 1, 2 and 3 (including A and E) = 172¼.
Average direct labor cost = \$2.07.

the proper angle in order to make the streams of water impinge at certain points. This position and angle having proved to be right on the first ring, further tests were not needed. Should the shop be called on to manufacture sprinkler rings in large quantities, the record now held will furnish valuable information. The time study man will then begin to divide the long operations into shorter ones, carrying the division to that point where the cost of further divisions would exceed the saving realized by use of the observation.

The handling of package freight has been studied at length by M. B. Waterman, engineer for the J. M. Dodge Company, Philadelphia. A monograph on the subject, written by him, has been published by the company in pamphlet form and illustrates at length the design of freight stations for different sorts of service, like handling outbound freight, for example, or transferring freight and caring for both inbound and outbound merchandise. The plans cover also steamship terminals and in all cases involve the use of the telfer for transportation about the terminals. The author mentions that the mechanical system in freight handling problems is recognized, but the attempt at the present time is to hide the mechanical work just as for some time automobiles were given the appearance of the horse-drawn vehicle.

The Pennsylvania Steel Company banked the No. 4 furnace of its Steelton, Pa., group on October 20 for the purpose of making some connections. Blast was put on again November 3.

A 35-Ton Shipbuilding Crane

At the plant of the New York Shipbuilding Company, Camden, N. J., a new type of shipbuilding crane has been installed. The machine is of the revolving locomotive type, mounted on a gantry, and was designed and built by the McMyler Interstate Company, Bedford, Ohio. Although cranes similar to this one have been used before and especially at the plant of the Maryland Steel Company, the one installed at Camden is novel since it is arranged to travel backward and forward on the gantry and serve both sides of the pier on which it is located.

Among the various things which this crane can do are to hoist a load at two different speeds, to revolve, to move backward and forward on the gantry and to travel along the dock by its own power. The capacity of the machine is 35 tons at a 20-ft. radius and 15 tons at a radius of 68 ft. The crane is moved backward and forward on the gantry by a wire rope which is attached to each end of the gantry and is wound around a worm-driven drum under the center of the machine. In this way the crane is always locked, thus preventing it from being moved across the gantry by the wind. A motor which is placed in the center of the gantry and transmits power to one truck on either side of the dock through steel shafts and gears, propels the machine along the dock.

Two other motors are used, one for hoisting the load



A New Crane Built for the New York Shipbuilding Company by the McMyler Interstate Company, Bedford, Ohio.

and the other for rotating, raising and lowering the boom and moving the machine backward and forward across the gantry. The hoisting speed is 15 ft. per minute with a 35-ton load and double that figure for a 15-ton load. Two complete revolutions of the machine can be made in 1 min. The movement across the gantry is 25 ft. per minute, and the rate of travel along the dock is 150 ft. per minute. While higher speeds were first contemplated, on account of the lack of sufficient driving power these speeds had to be used. Direct current at a potential of 220 volts is supplied to the machine from a third rail along the dock, across the gantry and below the rotating frame.

Crusher Litigation.—To correct a misapprehension existing in some quarters regarding the extent of a court decision in a litigation which was recently had with the Williams Crusher Company, the Pennsylvania Crusher Company, Stephen Girard Building, Philadelphia, Pa., announces that it is still in a position to make hammer crushers. In this action it was the wear adjustment device that was adjudged to be an infringement and not the loose arm or swing-hammer principle which has been public property for many years. The infringing device has been improved and it is claimed that it does not now infringe on any patents, while at the same time the machine has been much improved.

Judicial Decisions of Interest to Manufacturers

ABSTRACTED BY A. L. H. STREET.

Implied Warranty of Manufactured Articles.—A manufacturer, in offering articles for sale to one who has no opportunity to inspect before buying, impliedly warrants that they are reasonably fit for the purpose for which they are intended. (Arkansas Supreme Court, *S. F. Bowser & Co. vs. Kilgore*, 139 Southwestern Reporter, 541.)

Partnership Name as Good Will.—The name and style under which partnership business has been conducted is a part of the firm's good will, and transferable as such to the purchaser of the business in bankruptcy. (New York Supreme Court, *New York County Special Term, James Van Dyck Company vs. F. V. Reilly Company*, 130 New York Supplement, 755.)

Buyer Entitled to Rescind Contract for Delay in Delivery or Change in Method of Shipment.—One may repudiate his contract to buy on the seller failing to deliver within the time fixed, or may refuse to receive goods sent by express which were to be sent by freight. (Alabama Appellate Court, *Clauss Shear Company vs. Alabama Barber Supply Company*, 56 Southern Reporter, 49.)

When Articles Sold Are Not Impliedly Warranted.—Under a contract to manufacture specific articles of given weight, size and materials, according to plans—in this case track, grip cars, etc.—there is no implied warranty of the articles by the seller, though they are intended to be marshaled together as machinery. (Pennsylvania Supreme Court, *John A. Roebing's Sons Company vs. American Amusement & Construction Company*, 80 Atlantic Reporter, 647.)

Liability of Carriers of Freight or Express on Changing Route or Method of Shipment.—A carrier of freight or express becomes liable as an insurer by altering the route or manner of shipment from that required by the contract for carriage, even as against a particular cause of loss or damage to the shipment for which he would not have been liable had the contract not been departed from by him. (Massachusetts Supreme Judicial Court, *McKahan vs. American Express Company*, 95 Northeastern Reporter, 785.)

Necessity for Tender of Price by Buyer on Seller's Default.—If one contracting to sell articles breaks the agreement by delivering them to a third person, the buyer need not tender the price to the seller as a condition precedent to his right to sue the seller for resulting damages. (New Jersey Court of Errors and Appeals, *Gruen vs. George A. Ohl & Co.*, 80 Atlantic Reporter, 547.)

Liability for Injury to Teamster.—An employer is not liable for the death of an experienced teamster, caused by a heavy casting which he was hauling rolling to the rear of the wagon bed and tipping the wagon, on the theory that the employer was negligent in not having the bed secured to the front bolster or axle. (New York Supreme Court, Fourth Appellate Division, *Kalbach vs. Ross*, 129 New York Supplement, 243.)

Revocation of Rescission of Contract to Buy.—A buyer's acceptance and payment for goods after notifying the seller that he would not accept delivery amounts to a revocation of the buyer's rescission, equally binding upon both parties. (New York Supreme Court, Third Appellate Division, *Sturges & Burn Mfg. Company vs. American Separator Company*, 129 New York Supplement, 210.)

Right of Railroad Company to Make Freight Delivery Charge.—Railroad companies are entitled to make a reasonable charge for delivering freight to and receiving it from industrial plants located on spur tracks upward of one-fifth of a mile from the companies' yards or main lines. (United States Commerce Court, *Atchison, Topeka & Santa Fé Railway Company vs. Interstate Commerce Commission*, 188 Federal Reporter, 229.)

Right to Rescind Contract to Buy Machinery and to Recover Damages for Breach of Warranty.—The fact that a buyer of machinery retains it beyond the time for trial fixed by the contract of sale does not show waiver of his right to rescind the contract for breach of warranty of the machinery if the retention is at the seller's request to enable him to remedy defects. If the machinery is bought for a particular purpose and the buyer elects to retain it and sue for breach of warranty, he can recover not only the difference between the value of the machinery as warranted and its actual value but also any other damages which are direct and probable results of the breach. (California District Court of Appeal, *Luitweiler Pumping Engine Company vs. Ukiah Water & Improvement Company*, 116 Pacific Reporter, 707.)

Liability for Injury at Steam Hammer.—An employer is liable for injury to a blacksmith's helper at a steam hammer caused by the blacksmith, who was given sole charge of the hammer, negligently placing it in motion. (Washington Supreme Court, *Dyer vs. Union Iron Works*, 117 Pacific Reporter, 387.)

When Employee Does Not Assume Risk of Unguarded Machinery.—In a suit for personal injury to an employee, based on the employer's failure to guard machinery, the defense of assumption of the risk is not available. (Pennsylvania Supreme Court, *Fegley vs. Lycoming Rubber Company*, 80 Atlantic Reporter, 870.)

Liability for Injury to Employee Riding Free on Private Railroad.—An iron company is not liable for the death of a miner while riding home on a short railroad operated by the company, on the theory that he was a passenger; no passengers being carried over the road and the employees being carried free as a matter of accommodation. (United States Circuit Court of Appeals, Sixth Circuit, *Dodd vs. Dayton Coal & Iron Company*, 188 Federal Reporter, 597.)

Duty to Warn Employee of Dangers.—An employer's duty to warn his workmen against dangers extends only to appliances used by them and to hidden dangers to which they are subjected and which the employee can reasonably foresee. (Washington Supreme Court, *Ponelli vs. Seattle Steel Company*, 116 Pacific Reporter, 864.)

Risk of Injury Through Unguarded Set Screw on Revolving Shaft Not Assumed.—A steel company's foreman did not assume the risk of being caught by an unguarded set screw on a revolving shaft while working near it, where notice of the defect had been given the company as required by the New York laws. (New York Supreme Court, Fourth Appellate Division, *Larsen vs. Lackawanna Steel Company*, 130 New York Supplement, 887.)

Liability for Injury to Structural Ironworker.—A building contractor is liable for negligent injury to a structural ironworker employed by the subcontractor for the construction of the iron work, where the contractor furnished the machinery used and paid the employee. (Washington Supreme Court, *James vs. Pearson*, 116 Pacific Reporter, 852.)

Liability of Seller of Structural Steel for Delay in Delivery.—A seller of steel for a bridge is liable for damages caused by his failure to deliver it on time, including loss to the buyer through suspension of the work, and loss of false work through a flood, where such damages were within contemplation of the parties when the contract was made. (Washington Supreme Court, *Interstate Engineering Company vs. Archer*, 117 Pacific Reporter, 470.)

Rights of Seller on Buyer's Breach of Contract to Buy Machinery.—Where machinery was sold on an agreement requiring the buyer to order shipment by a specified time, and giving him the right of inspection on delivery, and he broke the contract by failing to order shipment, the seller was not required to tender delivery and opportunity for inspection at the destination before suing on the agreement. His measure of damages was the difference between the cost of manufacturing the machinery and its value at the time and place of delivery. (United States Circuit Court, Northern District of New York, *Fisher Hydraulic & Machinery Company vs. Warner*, 188 Federal Reporter, 465.)

Liability for Breaking Contract to Buy.—On breach of a contract to buy manufactured articles the manufacturer can recover the difference between the cost of manufacture and the contract price. Though a contract of sale requires the articles sold to be "satisfactory" to the buyer, he may not unreasonably refuse to receive them. (New York Supreme Court, Fourth Appellate Division, *Oswego Falls Pulp & Paper Company vs. Stecher Lithographic Company*, 130 New York Supplement, 897.)

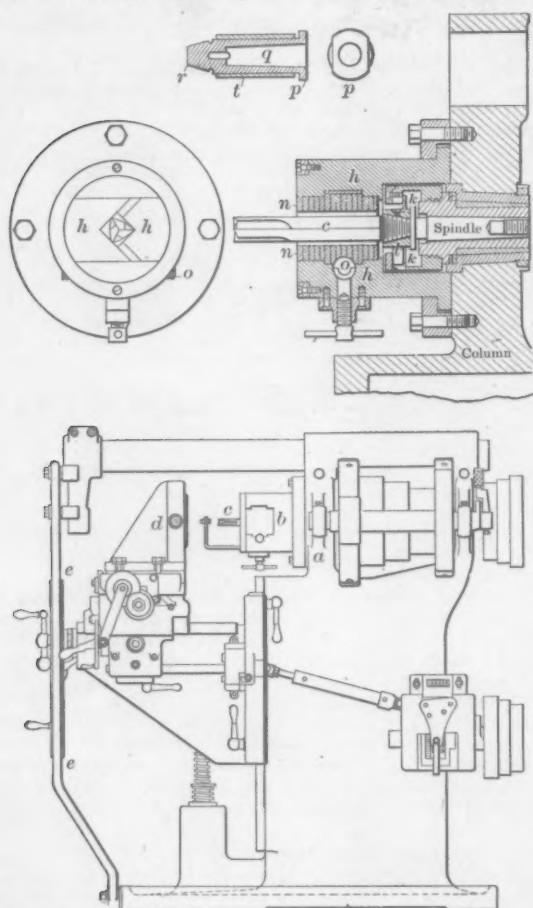
Liability of Transfer Companies.—A transfer company which undertakes to receive freight from a railroad company and deliver it to the consignee is liable as an insurer for the loss of the property through fire while in its possession. (Arkansas Supreme Court, *Arkadelphia Milling Company vs. Smoker Merchandise Company*, 139 Southwestern Reporter, 681.)

Scope of Authority of Collection Agents.—Unless otherwise specially authorized, a collection agent is not empowered to receive payment in any other medium than money; and his receipt of checks does not bind his employer, in the absence of ratification by the latter. Nor is the employer liable for other acts or declarations by the agent in the absence of authorization or ratification. (Nevada Supreme Court, *Roberts, Johnson & Rand Shoe Company vs. McKim*, 117 Pacific Reporter, 73.)

The Le Blond Combination Miller

Many attempts have been made to produce a practical tool for boring square holes and among the most recent developments in this line is a new one designed by the R. K. Le Blond Machine Tool Company, Cincinnati, Ohio, for the Niles-Bement-Pond Company, 111 Broadway, New York, N. Y. The tool is a special combination one that is not only adapted for milling square holes but also possesses all the features of a standard milling machine. The design of this machine in general follows that of the maker's No. 2, plain miller with such changes as it was thought would prove advantageous in the operation of the square hole cutters.

The principle used in this work is the same as that employed in other devices, namely the revolution of a triangular-shaped bit similar in construction to an end mill in a stationary master guide, having the same general appearance as a regular drill chuck. One important change, however, is the fastening of this stationary guiding chuck directly to the column of the machine by a flange, an arrangement which it is claimed eliminates the lost motion troubles formerly encountered. The cutter re-



A New Machine Attachment for Cutting Square Holes Built for the Niles-Bement-Pond Company by the R. K. Le Blond Machine Tool Company, Cincinnati, Ohio.

ceives its motion from a special driving member fastened to the spindle nose, and this member not only causes the cutter to rotate, but at the same time gives it sufficient freedom to travel eccentrically in the master guide.

Referring to the accompanying engraving, *a* is the column of the machine with the main spindle bearing, while *b* is the detachable chuck for cutting square holes. The cutter, a special vise for holding the work and a special brace connecting the knee with the overhanging arm and the base are indicated by *c*, *d* and *e* respectively. The square hole arrangement shown in the cross section in the upper right portion of the cut consists essentially of two separate bodies. The first of these is the driving member *k*, which is fastened to the spindle nose and the upper is the stationary guiding chuck *h*, which is bolted to the column over main bearing. The driving member contains a floating driving dog *l* with which the cutters *c* engage by a taper thread. A floating thrust plate located behind this dog takes up the end thrust of the drills. The

stationary driving chuck contains the master guide, which consists of two jaws *n-n* forming an adjustable square guiding hole in which the cutter is forced to describe its particular cam motion. The space between these two guiding jaws is controlled by the right and left hand screw *o* which opens and closes them according to the size of drill used.

The entire arrangement for cutting square holes can be easily detached in a very little time and the machine is ready for regular milling work or vice versa. When it is desired to cut square holes in tough material the maker recommends that a round hole be previously drilled and for this reason the machine is furnished with an appliance for operating ordinary twist drills which engages in the arrangement for boring square holes. In this way it is possible to perform both operations successively in the same work piece. The attachment used in connection for boring round holes is shown in section at the top of the engraving and consists of a round bushing, *t*, which is inserted in the square guiding hole. This serves as a bearing for the shank *p*, which contains a standard Morse taper, *q*. This shank is fastened in the driving member by the taper thread *r* and makes a complete revolution inside the bushing *t*. Any size of twist drill can be inserted in the Morse cone, and like the square hole attachment this twist drill arrangement can be easily removed.

As the attachment for cutting square holes projects considerably beyond the spindle nose, the working space in front of the cutter would thus be decreased on a standard machine. To overcome this difficulty the column bearing of the main spindle has been set back a distance equal to the projection of the attachment, thus maintaining the full working range of the table. In order to secure absolute rigidity of the work pieces on the table a special brace, *e*, is provided which connects the knee with the overhanging arm as well as with the base of the machine. Two separate cross feeds are provided for the machine, one for regular milling work and the other which has a very fine feed starting from 0.001 in. per revolution of the spindle for the cutting of the square holes which requires a fine feed. A special vise, *d*, is used for holding the work absolutely rigid while cutting square holes. The machine is furnished with a complete equipment for handling regular plain milling work and the range for boring square holes is from 1/4 to 2 in.

Prize Contest of the Society of German Foundrymen

The Society of German Foundrymen (Vereins Deutscher Giessereifachleute) will award three prizes—1,000, 500 and 300 marks, respectively—to any person giving the best answer to the following question: "Has there been made any decided progress in the last 20 years in the construction and running of cupola furnaces?" Special value is put on the economy of the furnaces and the quality of the molten metal. The hygienic point should also be defined. The judges are: F. Wust, Aachen; W. Schlenker, Berlin; A. Nachtweh, Hanover; C. Gilles, Berlin; F. Meyer, Wintherthur; C. Henning, Mannheim; H. Adammer, Hengelo; C. Humperdinck, Durlach; H. Dahl, Berlin; F. Bock, Berlin. The conditions governing the contest can be obtained from the office of the society, 60 Sybel street, Berlin-Charlottenburg, Germany.

The Crawford Locomotive & Car Company, Streator, Ill., recently received a large contract from the Detroit, Toledo & Ironton Railway Company, through its representative, the New York Trust Company, 26 Broad street, New York, for the reinforcing and repairing of freight equipment. These cars will be shipped on their own wheels from the railroad company's terminal at Leipsic, Ohio. About two years ago the Crawford Company repaired a lot of cars for this road, which have proved eminently satisfactory; the cost of maintenance for running repairs to the rebuilt cars having been reduced to almost nothing. The company has a large plant and is now making extensive improvements, and is in position to build all classes of new freight cars, furnish steel underframes, and do general repairs to cars.

The Machinery Markets

The prospect of business with the railroads continues to be awaited with expectancy. General trade conditions are good and expected to improve. From Chicago the Illinois Central Railroad calls for \$20,000 to \$25,000 worth of machinery. The New York market has received a list from the Lehigh Coal & Navigation Company, Lansford, Pa., calling for an expenditure of about \$20,000. Cincinnati conditions also indicate that the railroads are to be an active factor at no distant date. General inquiries there are few, although the usual number of single tool orders are being booked, a portion of the business coming from auto truck builders. Cleveland notes an improvement in the demand for small lots of machinery. Most of the activity is in auto parts. Attention has been called also in Cleveland to an inquiry for ore-handling machinery. Small equipment is being called for on the Pacific coast and the demand for logging, saw mill and wood-working machinery continues fairly good. From Philadelphia comes word that trade is quiet, with not much of note aside from inquiries for crane equipment. Detroit trade shows an improvement in the demand for wood-working machinery. Reports from St. Louis and the Southwest are satisfactory. The South appears to be awaiting the advent of the new year.

New York

NEW YORK, November 15, 1911.

While no big business is reported in the New York machinery market an optimistic feeling prevails and predictions are general that conditions are improving and that really good business is on the way, unless favorable indications fail. Several sales of individual machine tools are reported. The Delaware, Lackawanna & Western Railroad has been doing some buying and the Pennsylvania Railroad is in the market for several machine tools for its Trenton shops. Bids are in on the New York, New Haven & Hartford list but the business has not been let. Tangible news of interest is a list issued by the Lehigh Coal & Navigation Company, Lansford, Pa., for a fair sized lot of requirements which will call for an expenditure of about \$20,000. Export conditions continue good. Information received by New York machinery houses is to the effect that the recent defeat of reciprocity in Canada will lead to the erection and extension of plants owned by American manufacturers in the Dominion. The B. F. Sturtevant Company, Hyde Park, Mass., it is reported, has taken the initial steps toward the erection of a plant in Canada. A number of other American companies now manufacturing in Canada are planning extensions to their present facilities.

The Lehigh Coal & Navigation Company, Lansford, Pa., has issued a small list of machine shop requirements which may later on be followed by other purchases. The list includes one 18-in. double traveling-head shaping machine, one heavy floor grinder with two wheels, 4-in. face and 24 or 36-in. diameter, one 48 x 48 in. x 10-ft. planer, one 90-in. standard double head driving wheel lathe, and other tools. All these machines are to be motor driven and designed for 250-volt direct current.

The Pioneer Broom Company, Amsterdam, N. Y., is inquiring for an engine and elevator to be installed in the addition it is erecting to its plant.

The Buffalo-Dehn Company, Buffalo, N. Y., manufacturer of wire and sheet metal ware, will soon be in the market for wire bending and forming machines and desires information along those lines. The company recently announced plans for a new building, but has not as yet decided upon the location.

The extensive new plant of the Victor Motor Truck Company, Buffalo, N. Y., now building at Military and Beaver roads and the New York Central Railroad, North Buffalo, is nearing completion and will soon be in readiness for the installation of machinery and equipment.

The Water Power Vacuum Cleaner Company, with offices at 730 Main street, Buffalo, has established its manufacturing plant at 80-82 West Mohawk street.

The Niagara Gasoline Motor Company, Buffalo, is building a one-story brick addition to its plant at Breckenridge and Barton streets.

Weaver, Naylor & Co., Buffalo, will build a plant for the manufacture of roofing on Chandler street and the New York Central Railroad belt line, near Military road.

G. Elias & Bro., Buffalo, are building a two-story brick and steel wood working factory and box factory at Elk and Peabody streets and the Buffalo Creek Terminal Railroad.

The Strong Steel Foundry Company, Main and Am-

herst streets, Buffalo, which has purchased a site at Hertel avenue and the Erie Railroad, will erect a pattern building there at once. The remaining buildings of its proposed plant will not be constructed until next year.

The James H. Gray Milling Company has been incorporated at Springville, N. Y., where it will operate a flouring mill and feed mill. The incorporators are James H., Edwin A. and B. S. Gray.

The Endicott-Johnson Company is having plans prepared for a shoe factory to be erected at Lester-shire, N. Y. Geo. F. Johnson is general manager.

The auxiliary pumping station and electric lighting plant to be built by the city of Oswego, N. Y., will be 50 x 325 ft. and one story with concrete floor and roof and interior finish.

The S. R. Mfg. Company has been incorporated at Schenectady, N. Y., with a capital stock of \$50,000, to manufacture motors, engines, motor vehicles, etc. Christian Steenstrup, Karl M. Rossi and Ralph J. Ury, of Schenectady, are the incorporators.

The Morrow Mfg. Company, Elmira, N. Y., manufacturer of automobile parts, is equipping its plant with considerable new machinery, for which orders were recently placed, including a screw machine and a number of shapers, gear cutters and grinding machines.

The Lock City Laundry Company, Lockport, N. Y., is erecting a two-story structural steel and brick laundry building, for which considerable laundry machinery will be required.

The Delaware & Hudson Railroad Company is completing plans for additions and improvements to its shops and yards at Oneonta, N. Y., calling for an expenditure of about \$250,000. Geo. H. Burgess, Albany, N. Y., is chief engineer.

The World's Dispensary Medical Association, 663 Main street, Buffalo, Dr. Ray V. Pierce, president, is completing and equipping a chemical laboratory factory and box and bottling works at Hamburg, N. Y.

The Commissioners of Water Works, Erie, Pa., are receiving bids until December 6 for the designing, constructing and erecting of a 20,000,000-gal. triple expansion, crank and fly-wheel condensing pumping engine. Chester & Fleming, Pittsburgh, Pa., are the consulting engineers.

New England

BOSTON, MASS., November 14, 1911.

The dealers have experienced some improvement in orders for machine tools and their reports from other centers and from some of the manufacturers whom they represent tend to show that a better condition prevails generally.

An analysis of answers to confidential inquiries to manufacturers engaged in metal industries in New England as to the condition of their business reveals a more encouraging condition than many observers are willing to accept. Out of 20 answers which discussed the situation frankly, these including all that have been received, 12 report business good, five find it fairly good, one dull but with prospects which appear hopeful, and two put it as bad. Only two machine tool builders are included; one of them has a poor domestic trade but a satisfactory foreign business. The machinery business as a whole is duller of all, which is always the case under conditions as they now exist.

There are exceptions, however, a marked improvement having been experienced in some cases. A common report from many lines of trade is that collections are unsatisfactory. Orders are usually smaller than normal and are for immediate shipment. Prices are not what they should be, for competition is unusually keen. One large house makes a statement of what is rather a common experience, as follows: "We have not considered any extensive improvement in the plant, in general, but have found it necessary to contract for a few machines to keep abreast of our competitors. Our replacement account is a little larger than usual at this time of the year, owing, no doubt, to the fact that we have put off from time to time the expenditures on account of the uncertainty of the business outlook."

C. B. Hershey, Detroit, Mich., has been made sales manager of the Bath Grinder Company, Fitchburg, Mass., manufacturer of grinding machines.

The Geometric Tool Company, New Haven, Conn., manufacturer of special machinery and tools, is considering the erection of an additional building in the near future, and plans are now being made for the structure. Additional manufacturing equipment will be required after the completion of the building, which will probably not be before next spring. The company states that business is good and has been right along, with a marked improvement in the last month or six weeks.

A dispatch from New Bedford, Mass., states that the Taunton-New Bedford Copper Company will build a new rolling mill at its works on North Front street, New Bedford, which will double the capacity of the plant. The mill will be 100 x 350 ft., of brick, steel and concrete. The work of construction will begin about December 1.

The new building of the Bryant Electric Company, Bridgeport, Conn., will be used for plating and polishing, and the equipment has been purchased.

The Underwood Typewriter Company, Hartford, Conn., has purchased the equipment for the additional large factory building which is about to be erected.

The New Haven Boiler Works, New Haven, Conn., will erect a one-story building, 48 x 136 ft., of brick and steel construction.

The Worcester Pressed Steel Company, Worcester, Mass., will erect a foundry building which will be devoted to the manufacture of special semi-steel castings for dies for the company's own use. A large office building in process of construction will relieve a considerable amount of space in the main building. The company has plans, which are not settled, for the building of a large rolling mill for cold rolling equipment. At present there are two stands in the works which are producing cold-rolled steel for the company's product.

The New York, New Haven & Hartford Railroad will build an addition to its power plant on Grand avenue, New Haven, Conn., 32 x 70 ft., in order to increase boiler and engine capacity.

The Swanton & Alburg Railway Company, which will be a part of the New Haven system, has been incorporated under Vermont laws to construct and operate a railroad from Swanton to Alburg, a distance of 10 miles, constituting a connection between the St. Johnsbury and Lake Champlain and the Rutland railroads.

The Merrick Horseshoe Calk Company, Hartford, Conn., has organized with P. S. Ney, president; William Merrick, vice-president, and M. J. Black, treasurer. Manufacturing has already begun.

Philadelphia

PHILADELPHIA, PA., November 14, 1911.

A bitterly contested municipal election has had some influence on local trade, although the general out-of-town demand is reported as being less active. Few propositions of any size are under negotiation and little business involving the purchase of more than a few tools by any one concern is to be noted. While business is light, competition for such inquiries as have developed has been keen and sellers are more reticent regarding information in connection with pending negotiations. Considerable instability of prices is reported and concessions are frequently made, if necessary to obtain an order. Some little business is pending in crane equipment and conveying machinery but the demand for power transmission equipment has been lighter. While a fair amount of business in boilers and engines is still under negotiation, orders in this field develop but slowly. Secondhand machinery merchants report a moderate demand for metal working-machine tools and a small amount of general machinery and electrical equipment, but the aggregate

business is still comparatively small. There is no change in the general foundry situation; steel casting plants have, in instances booked a better volume of orders for early delivery but are not very well fixed for forward business. Gray iron foundries report unchanged conditions. Builders of machinery and tools do not report any material gain in orders, bookings are as a rule, confined to single tools. Special tool builders are generally in better shape as far as orders on hand are concerned than are makers of the standard type of metal working equipment.

E. T. & F. E. Mathewson, 929 Real Estate Trust Building, have been appointed direct representatives of Charles H. Besly & Co., Chicago, Ill., manufacturers of disk grinders for metal work and pattern making purposes, in the Philadelphia territory.

R. H. Comey & Co., dyers and bleachers, Camden, N. J., are having plans prepared for a brick and iron boiler house, 40 x 60 ft., to be erected at their South Camden plant. Two 150 hp. boilers, for which orders have already been placed, will be installed.

Frank Toomey, secondhand machinery, reports a very fair business in both new and secondhand machinery and electrical equipment. The demand has not been confined to any particular line but covers pretty generally the full range of metal-working machinery and tools.

The Waynesboro Metal & Foundry Company, Waynesboro, Pa., has been incorporated with a capital stock of \$50,000. Incorporators named include F. D. Miller, C. V. Moore, George H. Armacast and John C. Benedict, of Westminster, Md., and George B. Beaver, of Waynesboro, Pa. George H. Armacast is named as treasurer. While no particulars are available, it is said that the company will engage in the manufacture of iron, steel and brass castings.

A number of local builders are estimating on the construction of a pump house 22 x 38 ft., to be erected in Miller, W. Va., for the Baltimore & Ohio Railroad.

Plans and specifications have been posted for estimate for a nine-story reinforced concrete manufacturing building, from plans by Carl P. Berger, to be erected at 506-512 Race street for A. Hartung. The building will be 79 x 130 ft., open on all sides, with metal window frames, and modern safety appliances are to be installed. Plans for the power plant are expected to be ready for estimate in the near future.

The Goeringer Carpet Sweeper Company has been incorporated at Wilkes-Barre, Pa., to manufacture carpet sweepers, etc. The company has procured a plot of land in the east end and is having plans prepared for a factory building. The directors are Frederick Goeringer, Dr. O. K. Grier, L. Siegfried, C. W. Beckley and F. R. Stokes.

Chicago

CHICAGO, ILL., November 14, 1911.

The past week has shown a very fair record of machinery sales, both in the aggregate of miscellaneous orders for one and two machines and of a number of larger inquiries. At present the most interesting inquiry in the market is that of the Illinois Central Railroad, which has out a list of machines totaling in value between \$20,000 and \$25,000. It is understood that this list will be closed the coming week. The demand for second-hand machinery is very quiet.

The Concrete Mixing & Conveying Company, Chicago, has been incorporated with a capital stock of \$10,000 for the purpose of manufacturing and dealing in machinery, apparatus, building material, etc. The incorporators are George Gillette, R. T. Elwell and Russell P. Fischer.

The United States Steel Tank & Pipe Company, incorporated for \$10,000 by Henry N. Miller, S. M. Schall and A. C. Meyer, will manufacture and erect ventilating and power saving systems.

The Chicago Railway & Mill Supply Company, incorporated with a capital stock of \$5,000, will manufacture and deal in railroad machinery and equipment. The incorporators are A. W. Gillespie, C. B. Royal and J. S. Seely.

The National Spring Tire Company has been incorporated with a capital stock of \$125,000 by Charles L. Sigman, Jr., Louise Valance and Charles H. Jackson. It will manufacture and deal in automobiles, bicycles and accessories.

The Federal Motor Car Company has been incorporated to manufacture and deal in automobiles, vehicles, trucks, etc. The incorporators are Carey W. Rhodes, David F. Rosenthal and Leo S. Kositchek, and the capital stock is \$10,000.

The Reddick Mfg. Company has secured a permit for the erection of a three-story brick factory at 647

West Oak street, the cost of which is estimated at \$20,000.

The Hart Foundry Company, Peoria, Ill., is acquiring property adjoining its present plant to be used in connection with the extension of its capacity.

The Joliet Forge Company, Joliet, Ill., has been incorporated by J. J., H. H. and E. F. Sharpe, to continue, under corporate form, their business of manufacturing iron and steel forgings.

The Buchanan Mfg. Company, Eldorado, Ill., has been incorporated with a capital stock of \$15,000 for the manufacture of woven wire fence stretchers. The incorporators are C. C. Buchanan, J. M. Buchanan and Roy Gregg.

The H. L. E. Peterson Mfg. Company, Elgin, Ill., has been incorporated with a capital stock of \$25,000 to engage in a general foundry and manufacturing business. The incorporators are H. L. E. Peterson, Albert Fehrman and Julius G. Peterson.

The W. F. Hallett Boiler Company, Elgin, Ill., has been incorporated with a capital stock of \$5,000 for the purpose of manufacturing and dealing in boilers, engines and general machinery, by William S. Hallett, Ernestine C. Hallett and D. B. Ellis.

The Lavine Gear Company has transferred a portion of its activities to Corliss, Wis., where the erection of a \$100,000 factory is contemplated for next year. The incorporators in Wisconsin are George Uhlein, C. E. Albright and N. L. Baker.

The Commissioner of Public Works, Milwaukee, Wis., has been authorized to purchase machinery for a municipal lighting plant.

The Harmon Feed Water Purifier Company, Duluth, Minn., has been incorporated with a capital stock of \$25,000 by F. M. Harmon, of Cleveland, Ohio, and J. H. Upperman and John St. Clair, of Duluth.

The Winona Heating & Ventilating Company, Winona, Minn., is about to increase its capital stock and will enlarge its plant by the addition of a one-story brick and concrete building 36 x 100 ft.

The Des Moines Street Railway Company, Des Moines, Iowa, is planning the expenditure of \$150,000 in the improvement of its power plant.

The Baker Mfg. Company, Fort Dodge, Iowa, has purchased property on Eighteenth street, where a four-story concrete fireproof building will be erected for the manufacture of windmills.

Clinton Bridge & Iron Works, Clinton, Iowa, as a result of a fire, received damage to its machinery to the amount of \$7,000.

The Beatrice Steel Tank Mfg. Company, Beatrice, Neb., has been organized with T. E. Adams president and Clarence S. Warren secretary and treasurer. New machinery will be installed.

Henry, S. D., has voted to issue bonds providing for the construction of a municipal water works system.

Ponca City, Okla., has authorized bonds to the amount of \$30,000 to provide for the erection of an electric light and power plant.

The Kenton Iron & Steel Company, South Charleston, W. Va., by its manager, J. W. Arnold, has contracted to establish a plant at Guthrie, Okla., the main building of which will be 100 x 250 ft. and which, when equipped, will represent an expenditure of about \$60,000.

Cleveland

CLEVELAND, OHIO, November 14, 1911.

While machine tool orders were rather light during the week the situation has improved, as is shown by a good volume of prospective business in small lots. Buyers are slow in placing orders, but dealers expect that much of the pending business will be placed shortly. Orders are scattered among manufacturers of various products, but the demand is most active from the makers of automobile parts and accessories, many of whom are adding to their equipment. Local manufacturers are figuring on an attractive inquiry for ore handling equipment, the order for which is expected to be placed very shortly. The demand for waterwheel equipment continues active. In addition to large orders from the Youngstown Sheet & Tube Company and the Pittsburgh Crucible Steel Company northern Ohio crane builders have recently taken a good volume of other crane orders. The demand for second hand machinery is fairly active.

The Chisholm & Moore Mfg. Company, Cleveland, has commenced the enlargement of its plant by fitting up for manufacturing purposes an adjoining building that it acquired some time ago, formerly occupied by the Garry Iron & Steel Company. When the extensions are completed the capacity of its malleable iron foundry will be increased 50 per cent. and the capacity

of its hoist department will be doubled. Sand blast machinery and some tumbling barrels will be purchased. The company is getting a good volume of orders in both departments and reports that its business this year will equal that of 1910, which was a very satisfactory year.

The Concheno Mining Company, controlled by Corrigan, McKinney & Co., Cleveland, will electrify its gold and silver mining property in the state of Chihuahua, Mexico. A large power plant with long distance transmission will be erected 10 miles from the mine. The property is now operated by a steam power plant, but the supply of wood, which is used for fuel, has been exhausted in the immediate vicinity and the new plant will be built where there is still plenty of wood for fuel. The capacity of the plant will be about 1000 kva. In addition to boilers and electrical equipment the company will purchase compressors, pumps, hoists, etc. The plant will be located about 90 miles from a railroad.

The city of Cleveland was authorized by the voters in the election November 7 to build a new municipal lighting plant, a proposal to issue \$2,000,000 in bonds to build a plant being approved. At the same election amendments to the franchise of the Cleveland Railway Company were approved. As a part of the agreement between the city and the railway company the latter is to expend \$2,500,000 in such improvements as the City Council shall designate. These will include extensions to its power plants, the adding of new cars and track extensions.

The Standard Steel Company, maker of polished sheets, is planning an extension to its plant and the installation of some new equipment. Additional space will be provided by the building of a 35-ft. lean-to on the main building. The company intends to install a double annealing furnace with a capacity of 40 tons a day, a 4-armed mechanical pickler, another mill, an electric crane of about 35 tons capacity, 126 or 132-in. power sheet shears, a roller leveler and three or four small motors. Its capital stock was recently increased from \$40,000 to \$100,000 to provide for the extensions. The company has opened offices in the Rockefeller Building, Cleveland.

The Director of Public Safety, Cleveland, will receive bids November 27 for a new engine and boiler room and machine shop for the Cleveland Boys' Home at Hudson, Ohio. Briggs & Nelson, Rose Building, are the architects. A 50-kw. generator will be purchased shortly. It is expected that some machine shop equipment will be needed a little later.

The Champion Spark Plug Company, Toledo, Ohio, has broken ground for a plant of steel and glass construction 72 x 102 ft. at Upton and Avondale avenues. The present location is on Jefferson avenue. The company, which is controlled by R. A. and F. D. Stranahan, plans to double its present machinery capacity.

The Advance Machinery Company, Toledo, Ohio, maker of ball bearing shapers and glue heaters, is putting in new machine shop equipment and making other improvements to its plant.

The Home Power Company, Ashtabula, Ohio, is expected to be in the market shortly for equipment for a plant for making power washing machines.

The Attwood Wrench, Tool & Stamping Company, Conneaut, Ohio, has been reorganized as the Attwood Mfg. Company and has taken over the business of the McLean Separator Company. The company has a capital stock of \$150,000 and will manufacture a self-adjusting pipe wrench and other products.

The Great Lakes Engineering Works, Detroit, Mich., has an inquiry out for several wood-working tools for its new plant at Ashtabula, Ohio.

The Toledo Machine & Tool Company, Toledo, Ohio, has received an order through the Lake Erie Nail & Supply Company, Cleveland, for five large motor driven forging presses for the Superior Drop Forge & Mfg. Company, Cleveland.

The new addition to the plant to be erected by the F. B. Stearns Company, Cleveland, will be 80 x 165 ft. four stories high, of mill construction. It will be used as an addition to the machine shop. The company is expected to buy some additional machine tool equipment.

The Winchester D handle factory will be removed from Attica to Bellevue, Ohio, where a new plant will be erected 120 x 40 ft. two stories. Corrugated sheet steel will be used in its construction.

The Trion Horn Mfg. Company, Conneaut, Ohio, has been incorporated with a capital stock of \$25,000 by Ira E. Stump and others to manufacture automobile horns.

The Swinehart Tire & Rubber Company, Akron, Ohio, is planning the erection of a large addition to its plant 50 x 200 ft.

The Ohio Steel & Wire Company, Warren, Ohio, has awarded a contract to the McClintic-Marshall Construction Company, Pittsburgh, for the erection of its new plant, which it is planned to have in operation in four months. E. A. Henry is general manager.

Detroit

DETROIT, MICH., November 14, 1911.

The past week showed no material increase in sales of machine tools and business continues below normal, but the number of inquiries has improved and dealers now anticipate a better business toward the end of the month, with a prospect that totals will fall but slightly below those of October. Mill and shop supplies show an increased demand and makers of special equipment are generally booking a very fair business. Some very fair inquiries for woodworking machinery are being negotiated, the demand for this class of equipment showing a decided improvement. Contractors' outfits and supplies are moving briskly. The second hand machinery trade is rather dull, metal working tools being relatively the best sellers. Reports from Kalamazoo and vicinity indicate that the paper industry is purchasing considerable machinery, the bulk of the business going to Eastern manufacturers. Outside of the automobile trade the demand for castings is rather satisfactory. Contractors are being asked to figure on considerable new work, indicating that activity in construction will continue to near the close of the year.

The Detroit Edison Illuminating Company is making extensive additions to its properties in Detroit, including the erection of a 7-story office building and a new substation on Grand River avenue. The company is also completing the building of a new battery station.

Fire destroyed the plant of the American Wood Grain Company, manufacturer of imitation wood covering for floors, causing a loss of \$60,000. General Manager T. A. Flockert states that the plant will be rebuilt at once. A large amount of valuable machinery will be replaced.

Arrangements have been completed for bringing the Victor Broom Company, of Grand Rapids, to this city. The company has purchased the buildings formerly occupied by the Dutton Flour Mills at 1026 Scotten avenue. Thomas F. Meek is general manager.

The Detroit Electric Appliance Company has incorporated with a capital stock of \$100,000 to engage in the manufacture of electrical and mechanical specialties. George C. Edmunds, W. T. Jones and G. M. McFedries are the principal stockholders.

The Fisher Body Company, manufacturer of automobile bodies, has taken out a permit for the erection of a five-story \$20,000 addition to its present plant.

Smith, Hinchman & Grylls, of this city, are taking figures on a large heating plant for the University of Michigan at Ann Arbor. A steel and concrete building 200 x 100 ft. will be erected, and the work includes water softening and coaling plants and a power plant which will be equipped with boilers of 4000 hp. and a 1000-hp. turbine to supply water power. The estimated cost of the improvements is \$280,000.

H. C. Hawk, Edward Branson and A. Williams, of Battle Creek, Mich., have organized a company with \$5,000 capital stock under the style of the Krinkle Company. Breakfast foods will be manufactured and the factory will be at Walkerville, Ont., across the river from Detroit.

The Aluminum Castings Company has started work on an addition to its present plant on Campau avenue, to cost about \$10,000.

The Detroit Creamery Company has increased its capital stock from \$600,000 to \$800,000. No extensions to the company's plant are contemplated at present, but it is probable that some additions to equipment may be made.

The Detroit Bi-Kar Company has incorporated with a capital stock of \$10,000 to manufacture and deal in motorcycles. A. Roseroot, J. J. Berkery and J. J. Chapin are the principal stockholders.

Preparations are being made by the Skalla Furniture Company, Niles, Mich., to rebuild its plant which was almost totally destroyed by fire.

Charles H. Bradford, Armada, Mich., is interested in the establishment of a hoop and stave mill at Port Huron, Mich.

The large power house of the Rapid Motor Vehicle Company at Pontiac, Mich., has been sold to the Pontiac Power Company. The new owner will remodel and enlarge the plant, changing the system from low to high-tension alternating current.

The Hildreth Mfg. Company, Lansing, Mich., manufacturer of gasoline motors and pumps, has increased its capital stock from \$75,000 to \$112,500.

The American Tool Works, St. Joseph, Mich., is building an addition to its factory, 40 x 40 ft. The company, which manufactures special tools and supplies, reports an excellent volume of business.

E. F. Rouse, Bay City, Mich., is forming a company to be known as the Virginia Equipment Company. A factory has been secured and will be equipped with machinery for the manufacture of dust guards for railway passenger cars.

The Michigan Fibre Box Company, Battle Creek, Mich., is planning to double the capacity of its plant in the near future. Additional machinery will be installed and the scope of manufacture extended.

The Vassar Milk Condensing Company has been organized at Vassar, Mich. A reinforced concrete condensing building will be erected at once.

The village of Millington, Mich., has granted a franchise for electric lighting to Oliver B. Whipple, of Saginaw. A plant will be equipped for operating January 1.

The Summers Fibre Company, Port Huron, Mich., has completed plans involving the expenditure of \$50,000 for additions to its plant and equipment. The name of the company is to be changed to the Summers Linen Company. Mattresses and woven goods are the chief products.

The American Corrugating Company, Grand Rapids, Mich., manufacturing corrugated board packing cases, is working to capacity and early next year an enlargement to the plant will be made.

Joseph Van Bogart, Battle Creek, Mich., is establishing a new mill and woodworking factory in that city.

The plant of the Harris Electric Company, Mt. Pleasant, Mich., has been purchased by the Chippewa River Power Company. The new owner has been authorized by the State Railway Commission to bond for \$2,000,000 and expects to expend a large sum in new equipment for its various properties.

The Brunswick-Balke-Collender Company, Muskegon, Mich., is making considerable additions to its plant, including an addition to the rubber department, 65 x 65 ft., and two new storage buildings.

The Genesee Coal Mining Company, Flint, Mich., is preparing to develop a large coal deposit near that city.

The Dowagiac Folding Fruit Box Company, Dowagiac, Mich., has been incorporated with a capital stock of \$25,000. The company has secured factory quarters and some machinery will probably be required. F. R. Richie and H. E. Agnew are among those interested.

The Baker-Hoekstra Company, Kalamazoo, Mich., manufacturer of confectioners' supplies, has increased its capital stock to \$50,000. A large amount of new machinery will be installed, some of which has already been provided for.

The Stearns Salt & Lumber Company, Ludington, Mich., has taken over the property of the Handy Things Company and will reorganize the latter concern under the style of the Handy Things Mfg. Company. Some new woodworking machinery will probably be required.

Negotiations are under way looking to the removal of the Spalding Engine Works from St. Joseph, Mich., to Berrien Springs, Mich. The move is planned to provide for an enlargement of the company's plant.

The Commonwealth Power Company, Jackson, Mich., is remodeling its power plant at Owosso, Mich., and will install three new transformers and considerable other electrical machinery. The company is planning a number of new transmission lines.

The Welch Motor Car Company, Pontiac, Mich., is to push work on the addition to its plant, 40 x 100 ft., which will be used in part as an assembling floor.

Cincinnati

CINCINNATI, OHIO, November 14, 1911.

The usual number of single tool orders are being booked, but the general inquiry is said to be more limited. There are indications that the long-looked-for railroad buying may commence at no distant date. Railroad shops in this vicinity are much busier than they were at this time last month.

The Queen & Crescent Railroad Company's shops at Ludlow, Ky., that have been operating at a limited capacity for quite a period, are now working a complete force and at full time.

The boiler makers report some improvement, with the smaller units in considerably better demand.

The automobile manufacturers are buying practically nothing in the machinery line, but the auto truck builders are reported to be more liberal customers.

The Apprenticeship and Continuation School committee appointed to investigate the apprenticeship question held a meeting at the Business Men's Club No-

November 9 and discussed a plan that will have an important bearing upon the future training of apprentices and mechanics. It is quite probable that the committee will be able to make its final report at the next meeting in December.

The industrial committee of the Cincinnati Commercial Association has completed arrangements for its fifth annual excursion November 16. The plants of the James Heekin Company, the Charles Boldt Glass Company and the R. K. LeBlond Machine Tool Company will be inspected, and at the latter place a luncheon will be served.

It is rumored that the Francke Lumber Company will soon make some extensive additions to its hardwood plant at St. Barnard, a Cincinnati suburb. The company's headquarters are in Berlin, Germany, but it has a branch office in Cincinnati.

The Kanawah Auto Truck Company, Charleston, W. Va., has been incorporated with \$50,000 capital stock by W. S. Roberts, George F. Gates and others. It is understood that the new company will only handle and repair auto trucks just now, but may engage in their manufacture later on.

Some refrigerating equipment will probably be required by the Gem City Abattoir Company, Dayton, Ohio, recently incorporated with \$22,000 capital stock. William J. Olt, John Roehm and others are interested in the new company.

A small electric lighting plant will probably be installed by the Lewisburg Lighting Company, recently incorporated with \$5,000 capital stock at Lewisburg, Ohio. A. C. Robeson and J. M. Bickel are named among the incorporators.

The Blackburn-Allen Company, recently mentioned, has been incorporated at Dayton, Ohio, with \$30,000 capital stock, to manufacture ignition apparatus. W. J. Blackburn and W. J. Allen are named among the incorporators.

The Allyn Engineering Company has moved its general offices from the Lyric Building, Cincinnati, to the office building of the Alvey-Ferguson Company, at Oakley. A branch office will be retained in the Lyric Building.

The Oxy-Acetylene Welding & Cutting Company is a new organization at Dayton, Ohio. Shop quarters have been secured in the Armory Building at Sixth and Canal streets.

The new plant of the Seinsheimer Paper Company on York street, Cincinnati, is nearing completion and will soon be ready for the necessary equipment.

It is reported that Swift & Co., Chicago, have completed plans for the large new concrete storage warehouse to be erected in Cincinnati and that the contract will be let at an early date. The proposed structure will be 75 x 100 ft., four stories.

The Columbus Pump Supply Company, Columbus, Ohio, has increased its capital stock from \$10,000 to \$15,000.

The Cincinnati Milling Machine Company has moved its general offices from its abandoned Spring Grove avenue shop to its large new plant at Oakley.

The South

LOUISVILLE, KY., November 14, 1911.

A perceptible slowing up in business is observed, although the situation is still generally reported as satisfactory. Fewer inquiries have put in an appearance, and while a good deal of business has been closed it has not as a rule been of large size. As the season is getting on to the point where buyers put off purchases because of the desire to hold down expenses until after the first of the new year arrives, this condition was to have been expected. Attention was called recently in *The Iron Age* to the development of the manual training idea in the South. A good deal of equipment is still being sold in this direction. In Louisville purchases of machinery for the two high schools where manual work is taught are being made constantly.

A blaze in the stove foundry of the Stratton & Terstegge Company, Fifteenth and Main streets, Louisville, caused damage of \$10,000. The fire was confined to the department used for making tinware and a good deal of metal working equipment was destroyed. This will have to be replaced and the company will make its purchases in the near future.

The Houser Mfg. Company, 644 East Jefferson street, Louisville, has completed the installation of a nickel-plating department, equipment for which was furnished by the Hanson-Van Winkle Company, Chicago. The Houser company, which makes dental supplies and brass fittings for distillers, moved its plant to Louisville recently from the East. It expects to

secure a new building before long, when enlargements will be made.

The Art Brass & Metal Works, which recently took over the plant of the Apex Mfg. Company, Louisville, has installed some brass working machinery.

The Red Chief Mfg. Company, Louisville, which recently increased its capital stock, has been making some improvements in its plant. It manufactures corn shellers.

F. A. Crush & Co., 1036 Everett avenue, Louisville, are marketing to the mill supply trade a cast iron rack for holding sheet rubber packing. It will be made by contract at first, as the concern has no immediate plans for building a plant.

The Louisville Gas Company is building a new power house and has let a contract for the installation of a 520-hp. Babcock & Wilcox boiler, with Ross automatic stokers. The company will let a contract this week for the installation of coal hoppers and conveying machinery.

The Dow Wire & Iron Works, Louisville, is erecting an additional storage warehouse for handling bar iron and other materials.

Caldwell & Drake, contractors for the new 11-story hotel, the Henry Watterson, in Louisville, are expected to announce shortly when a contract will be let for the power plant, refrigerating equipment and other machinery items.

The Falls City Construction Company, Louisville, has been awarded a contract for a court house and jail at Jonesboro, La. A heating plant is to be sublet.

The Board of Education, Louisville, is in the market for a \$500 metal working lathe to be installed in the forging department of the Manual Training High School. Bids close November 24. Sam D. Jones is business director of the board.

The Marine Electric Company, Louisville, has incorporated with \$5,000 capital stock for the purpose of operating a machine shop for electrical repairs. C. E. Thirwell, H. A. Tepel and C. G. Thirwell are the incorporators.

The Continental Car & Equipment Company, Louisville, has developed a 3½-ton electric truck following recent experiments along this line. The truck has been sent to New York to McKinley Boyle, president of the company. It has not yet been decided whether to manufacture the truck in Louisville or New York.

The Louisville Hospital Commission is advertising for bids on the new city hospital plant of five buildings, not including the power house, at an estimated cost of \$800,000. Bids will be opened January 4. The hospital will require a power plant and elevators. D. X. Murphy & Bro., Louisville, are the architects.

Madisonville, Ky., voted in favor of issuing bonds for the erection of a water works system. Plans for the construction of a plant will be taken up at once.

The Henderson, Ky., Tobacco Extract Works plans to erect an addition to its factory, with new equipment.

The Black Mountain Coal Company, Barboursville, Ky., recently organized, plans immediate development work. Dr. Samuel Bennett is in charge of the company's operations.

Ashland, Ky., has under consideration plans for the purchase of the water works plant owned and operated by a private corporation and the expenditure of \$75,000 for the installation of new equipment in the pumping station.

Russellville, Ky., has abandoned the project to build a water works system.

The Silverman Auto Company, Grand Rapids, Mich., is receiving bids through Pierre Lindhout, 718 Ashton Building, for a two-story and basement factory building 50 x 100 ft., of brick and mill construction, to cost approximately \$10,000. No machinery requirements are announced as yet.

The capital stock of the Dominion Iron Works, of Bristol, Tenn., has been increased to \$150,000.

A stone crushing plant of considerable proportions is to be built at Cleveland, Tenn., by Rymer Bros.

The Culleoka Produce Company, Culleoka, Tenn., near Columbia, is planning the erection of a packing plant.

Columbia, S. C., will install an additional pump in the municipal water plant.

The Atlantic Coal & Ice Corporation, Atlanta, Ga., will erect a cold storage plant for handling fruit. Refrigerating machinery will be purchased and the company expects to expend in the neighborhood of \$50,000.

The Oriskany Ore & Iron Company, S. L. Parish, president, is reported to be planning the erection of a blast furnace at Reusens, near Lynchburg, Va.

New York capital is reported to be interested in the consolidation of traction properties at Tulsa and Sapulpa, Okla., with the intention of connecting the towns by interurban lines. J. W. Orr, of Tulsa, and R. V.

Miller, of Sapulpa, are among those interested in the project.

James L. George, Memphis, Tenn., has purchased an electric light plant at Earle, Ark., a municipal franchise for its operation having been awarded him. The capacity of the plant will be doubled and an ice factory erected adjoining it.

D. Frank Clarke, Charles Clarke, J. Milton Clarke and others will erect a large sawmill at Melbourne, Fla., for the development of a large acreage of cypress and yellow pine timber in Brevard and Osceola counties in that State.

The Southern Mfg. Company, Gadsden, Ala., the plant of which was destroyed by fire several months ago, will be rebuilt in the immediate future.

R. A. Mitchell, president of the Alabama Power Company, Gadsden, Ala., is reported as announcing the erection of a hydroelectric plant at Talladega on the Little River, in Alabama. The survey for the plant has been completed and work is to be begun at once.

The Virginia Aerial Mfg. Company, Richmond, Va., has been incorporated with \$100,000 capital stock to manufacture devices for aeroplanes. The company has leased a factory site and is having plans prepared for a building and testing out plant. The incorporators are John C. Hagan, James D. Patton, A. L. Johnston, Jr., W. S. Forbes and G. Johnston.

The National Spring Bed Company, Norfolk, Va., has been incorporated with \$10,000 capital stock to manufacture beds, cots, couches, etc. The company has in course of erection a three-story building 30 x 100 ft., which is expected to be ready for occupancy in about three weeks. The equipment required includes one power punch press for working angle iron, one power hack saw, one power bed stretcher, one emery stand, one weaving machine and a quantity of pulleys, shafting, belting, etc. Catalogues and descriptive matter are desired.

The Board of Aldermen of Obion, Tenn., will receive bids until November 21 for constructing and equipping a water works system. C. H. Jenks, Union City, Tenn., is the engineer in charge.

The Paxton Lumber Company, Bristol, Va.-Tenn., is in the market for electric motors and desires quotations on 5, 7, 10 and 15-hp. for alternating current, 220 voltage, three phase, 60 cycle.

Indianapolis

INDIANAPOLIS, IND., November 14, 1911.

The Oolitic Stone Mills Company, Bloomington, Ind., has increased its capital stock from \$10,000 to \$20,000.

The Sheridan Water, Heat & Light Company, Sheridan, Ind., has been incorporated with \$100,000 capital stock, to furnish electric light and power. The directors are J. L. Vickery, J. A. Branson and P. Weaver.

The Bucyrus-Vulcan Steam Shovel Works will complete its new plant at Evansville, Ind., about the first of the year. About 1000 workmen will be employed there.

The Remy Electric Company, Anderson, Ind., has bought the R. C. Peters Company's headlight plant at Grand Rapids, Mich., and the equipment will be removed to Anderson, where a brick building is being erected 60 x 120 ft. to accommodate it.

The International Metal Polish Company, Indianapolis, which recently incorporated, has begun work on a new fireproof building 80 x 100 ft., two stories, to cost about \$25,000.

St. Louis

ST. LOUIS, MO., November 13, 1911.

Conditions in the machine tool market continue to show the same general improvement that has been noted in recent weeks, but there has been no accentuated gain in business, such as to presage any very large developments. The reports coming from the Southwestern territory in conjunction with inquiries for tools are of a very favorable character considered from the minor standpoint and the belief is that were political and trust-busting conditions different the increase in business would be very marked.

The United Drug Company, Boston, Mass., which recently established a branch in St. Louis, has decided to equip a plant here for the manufacture of candy, another for rubber goods and a third for stationery. Considerable mechanical equipment will be required.

The re-opening of the big plant of the American Car & Foundry Company, at Madison, Ill., has brought about a large increase in the force at the Helmbacher Forge & Rolling Mills which supplies much of the material required.

The Koken Barber Supply Company, St. Louis, is having plans drawn for a six-story factory 110 x 145 ft., which will more than double the company's present capacity. It will be equipped for the manufacture of barber chairs and other supplies of like type. The equipped factory will cost \$200,000.

The Eagle Aerial Mfg. Company, with \$100,000 capital stock, has been incorporated in St. Louis for the manufacture of a new type of aeroplane and aeroplane supplies. The incorporators are Thomas H. Keppel, Robert F. Jeese, Jesse E. Keppel, Joseph Van Raalte, H. G. Lind and Lionel Davis.

The Illinois Dredging & Construction Company, with \$100,000 capital stock, has been incorporated in East St. Louis by B. A. Campbell, C. H. F. G. Heinfeiden and W. H. Hebenstreidt and is in the market for heavy equipment for use in dredging and similar work.

H. Pauk & Sons Mfg. Company has purchased a five-story factory building in St. Louis which it will utilize as an extension of its show case factory as soon as it can be prepared and mechanical equipment installed.

The New System Plow & Planter Company, Alton, Ill., recently sold out because of internal and financial troubles, is to be reorganized and operations resumed with additional equipment.

The Rukes Steel Barrel & Welding Company, Kansas City, Mo., has been incorporated with \$15,000 capital stock and will equip a plant for the manufacture of a patented device. The incorporators are C. F. Rukes, Walter J. Scafe and Gustav Geis.

The Paris Auto Starter Company, Paris, Ill., has been incorporated with \$10,000 capital stock by Frank C. Fishback, E. B. Brooks and Paul P. Shutt for the manufacture of a self-cranking device for automobiles. A manufacturing plant will be equipped.

The McRee Green Mfg. Company, with \$50,000 capital stock, has been incorporated in St. Louis by McRee Green, H. W. Chandler and O. M. Green and will equip a factory for the manufacture of metal weather strips, screens, etc.

The Superior Shoe Mfg. Company, St. Louis, has been incorporated by Rudy E. Bloch, O. Burg and J. L. Kohner, with \$30,000 capital stock, and will at once equip a factory for the manufacture of shoes. A building has been leased for the purpose. It will employ 150 hands.

The Curtis Jack & Truck Company, with \$75,000 capital stock, has been incorporated in St. Louis by J. R. Curtis, H. C. Flunker, A. W. Smith, Otto Stifel and George E. Booth. A plant will be equipped for the manufacture of a combination jack and hand truck for the handling of automobiles.

The Buchanan Mfg. Company, Eldorado, Ill., has been incorporated with \$15,000 capital stock and will equip a factory for the manufacture of wire fence stretchers.

The H. D. E. Peterson Mfg. Company, Elgin, Ill., has been incorporated with \$25,000 capital stock by H. D. E. Peterson, Albert Fehrman and Julius G. Peterson and will equip a plant for a general foundry and manufacturing business.

The National Rubber Company, headed by Eugene Swarzwald, of St. Louis, has acquired the plant of the St. Louis Electric Heating Company, sold under bankruptcy proceedings, and will equip the buildings for the manufacture of rubber paints and other waterproofing liquids.

The Glenolden Furnace Company, with \$50,000 capital stock, has been incorporated in St. Louis by Charles, Robert and James Adams and will establish a factory for the manufacture of heating furnaces.

The Automatic Register Company, East St. Louis, Ill., manufacturer of a device for automatically registering the number of passengers entering a car and the number of miles traveled by each, is arranging for the enlargement of its plant within the near future, at an expenditure of about \$125,000. The company has had its register tested on the Illinois Traction System, which is now planning to equip a number of its cars with the apparatus.

The Moon Motor Car Company, St. Louis, will build an addition to its factory at a cost of \$6,000.

The Monarch Metal Weather Strip Company, St. Louis, has purchased a site upon which a two-story factory building to cost \$14,000 will be erected.

The Russellville Water & Light Company, Russellville, Ark., will receive bids until November 20 for furnishing material and constructing a water works system in that city. The equipment includes two 500,000-gal. per day motor-driven turbine pumps, two 30-hp., 220-volt, three-phase, 60-cycle, induction motors, pump station, reservoir, cast-iron pipe, valves, boxes, hydrants, etc.

Texas

AUSTIN, TEXAS, November 13, 1911.

The cotton-holding movement is beginning to have a telling effect upon various lines of business in Texas. The large volume of money that is usually found in the channels of trade at this season of the year when the cotton crop is large and good prices prevail is noticeably absent just now. This condition is not felt as much by dealers in machinery as it is by merchants and others who are dependent directly upon the cotton grower for a large share of their revenue, but it naturally is having more or less bad effect upon the former branch of business.

The National Food Company has let the contract for the erection of a new factory at Decatur. It will be equipped with new and modern machinery for the manufacture of various kinds of food products.

The Commercial Club, of Tioga, is promoting the construction of a complete sewer system and also the installation of an electric light plant.

J. T. Sanderson, Clarksburg, W. Va., is promoting the organization of a company with a capital stock of \$250,000 to establish a large woolen mill at San Angelo, Texas. One of the great inducements for the proposed industry is that there is annually concentrated at that place more than 4,000,000 lb. of wool.

Plans have been drawn and approved for the construction of a 15-ft. dam across the Colorado River near Austin and the installation of a small hydroelectric plant for the purpose of irrigating several thousand acres of land and furnishing power for the operation of the machinery of the farmers of that section. Those interested in the enterprise are D. B. Matthews, Charles Jones and Goodwin Jones. J. C. Dumont is the engineer. There will be about \$50,000 invested in the enterprise.

The Kenedy Light & Power Company has just finished the installation of an electric light and power plant at Kenedy.

The City Council of Kenedy has under consideration the installing of a waterworks plant and sewer system.

The Athens Pottery Company, which was recently formed at Athens with a capital stock of \$100,000, has taken over the pottery manufacturing plants of P. E. Miller at that place and of the Winfield Pottery Company near Winfield. The new company will install machinery and greatly enlarge the two plants.

The Intermittent Vacuum Pre-cooling Company, of Wilmington, Del., has been awarded the contract for installing a pre-cooling plant at San Benito, Texas, at a cost of about \$100,000. The plant will have a daily capacity of about 50 cars. S. A. Robertson, of San Benito, and associates are interested in the project.

Womack & Nelms are installing a new dynamo and other machinery in their electric light and power plant at Caldwell.

The cotton gin of P. H. McCormick and associates at El Dorado, which was destroyed by fire recently, will be rebuilt.

The Payne-Parsley Machine & Mfg. Company will reconstruct their cotton-chopping machine factory at Crockett, which was recently destroyed by fire. It will be considerably larger than the original plant.

Oscar Pacius, of Sanderson, and associates will erect a factory at Alpine for the manufacture of wax from the candelilla plant. The people of Alpine have donated the site of the proposed industry. Mr. Pacius and associates recently finished a similar factory at Sanderson.

The Trinity Compress & Gin Company has been formed at Trinity with a capital stock of \$25,000. The incorporators are W. A. Bell, J. B. Gibson, J. C. Mansell and others.

The Navidad Mining Company has made application to the Department of Fomento of the Federal Government for a concession to install a hydroelectric plant upon the Navidad River near Iztlan, state of Oaxaca, Mexico. It will construct a dam across the river to obtain the initial power and will build a power transmission line from the plant to its mine.

The Commonwealth Mining Company is having plans prepared for a 300-ton mill that it will install at its Commonwealth mine at Pearce, Ariz.

J. F. Orosco will install a mill upon his group of mines near Mount Hopkins, Ariz.

The American Exploration & Mining Company will install a 50-ton cyanide plant at its mine near Steeple Rock, N. M.

The San Juan Mining Company will install a 200-ton reduction mill at its San Juan mine in the Taviche district, state of Oaxaca, Mexico.

The Alfarina Mining Company will install considerable machinery at its mine at Santa Barbara, state

of Chihuahua, Mexico. Frank Morehouse is general manager.

The El Carmen Mining Company will install a large reduction mill at its mine at Santa Barbara, Mexico. S. C. Alley is manager.

El Rayo Mining & Development Company, of Santa Barbara, state of Chihuahua, Mexico, will install two cable tramways at its property. James S. Colbath is manager.

At Corpus Christi plans are under way for a new water works to cost \$250,000.

The Hamlin Electric Light, Heat & Power Company, with a preliminary capital stock of \$10,000, has been incorporated by W. W. Johnson, W. S. Whaley and Clinton Fraser, at Hamlin, Texas, for the purpose of putting in a plant for municipal and private service.

The Pacific Coast

PORTLAND, ORE., November 9, 1911.

Inquiry for tools of the heavier types is almost entirely lacking. The larger shops of this territory require little new equipment at present, and while there is a fairly steady demand for small equipment the total volume of sales is light as compared with any of the Eastern trade centers. The railroads have been keeping out of the market of late, though the rapid extension of lines in Oregon and Washington will doubtless require considerable increase in the capacity of railroad shops during the next few years. The largest shop equipment in immediate prospect is that of the Berlin Machine Works, but as work is just being started on the buildings it will be some time before the machinery can be installed and the orders will probably be placed with Eastern manufacturers direct.

It is understood that a suit for foreclosure filed against the Moran Company, Seattle, Wash., by Bertram, Griscom & Jenks, of New York, is intended to bring about a reorganization and that additional capital will be invested for the construction of a large dry dock. It is considered doubtful, however, whether any material addition will be made to the shop equipment.

Logging, sawmill and woodworking machinery is rather quiet at the moment, but there is considerable inquiry and a general buying movement is expected during the coming month. Most of the mills in Oregon and Washington will be closed for repairs for 30 days beginning December 15 and advantage will be taken of the closed season for the installation of many needed improvements. This will also give an opportunity to dispose of the stocks on hand and the lumber interests anticipate an extremely busy season. The exportation of machinery to China, which has developed rapidly for the last few years, has been temporarily interrupted, though there is still a fair movement to Japan.

A number of sand and gravel firms operating on the Willamette and Columbia rivers are preparing to increase their equipment and orders are expected for considerable dredging machinery, as well as barges, etc.

The Pacific Bridge Company, Portland, is having plans drawn for a large clamshell dredge.

C. G. Fuller is building on Fifth street, Eltopia, Wash., a new blacksmith and machine shop.

It is reported that the Powell River Pulp & Paper Company, which has just completed a large plant on Powell River, B. C., will double its capacity.

The Ogle Mountain Mining Company, of which J. B. Fairclough, Oregon City, Ore., is president, contemplates the installation of new machinery at an expenditure of about \$100,000.

The Oriole Gold Mining Company, Grants Pass, Ore., is preparing to install a 50-ton ore mill.

The plant of the Imperial Powder Company at Chehalis, Wash., which was recently destroyed by fire, will be replaced immediately. The company is also figuring on installing a factory near Medford, Ore.

The Dalles, Ore., Lumber & Logging Company will make extensive improvements in its mill immediately after the first of the year. New band saws will be installed, replacing circular saws.

The power plant of the Schwager & Nettleton lumber mill, near Seattle, Wash., which was recently destroyed by fire, will be replaced shortly. The plant destroyed was valued at \$25,000.

Fred L. Webster, coast manager for the Allis-Chalmers Company, with headquarters at San Francisco, is visiting the northern offices.

The Atlas Gas Engine Works, Oakland, Cal., has leased a site at the foot of Twentieth avenue, in that city, where a new plant will be erected at once.

The Natomas Consolidated of California is preparing to replace its \$250,000 gold dredge near Folsom, Cal., which was recently destroyed by fire. Bucyrus

machinery is used in all this company's dredges.

The Pacific Gas & Electric Company, Sacramento, Cal., has authorized the issuance of bonds to the amount of \$3,000,000 to provide for the improvement and extension of its hydroelectric power system.

The Pacific Sewer Pipe Company, Los Angeles, Cal., is planning to add to its five plants already in operation a sixth which will cost \$350,000.

The Enterprise Foundry Company, San Francisco, Cal., has purchased a 20-acre site at Richmond, Cal., and will soon begin the erection of buildings for a new plant. A large force will be employed.

Western Canada

WINNIPEG, MAN., November 11, 1911.

Three of the industries of Medicine Hat, Alberta, have announced their intentions of enlarging their capacity in the spring. The Alberta Clay Products Company will expend \$175,000 in new buildings, the Medicine Hat Milling Company, \$60,000, and the sash and door factory, \$50,000.

At a meeting of the City Council of Battleford, Sask., last week it was decided to submit a supplementary by-law to the ratepayers providing for a further issue of \$100,000 for waterworks and sewers.

A considerable amount of money is being spent by the City Council of Prince Rupert, B. C., this year on improvements. The new waterworks system is estimated to cost \$550,000. About \$100,000 of this will be spent this year.

About \$200,000 will be expended by the Coal & Ore Docks Company on its plant at Port Arthur, Ont., this winter. Besides a great enlargement of the yard and storage ground, additional equipment for screening and sorting will be provided.

Frank V. Samwell, Guelph, Ont., is promoting a company with \$500,000 capital stock to build and operate a plant at Fort William, Ont., for the manufacture of wrought iron pipes. The terms the City Council of the latter municipality has agreed to in this connection will come up for ratification by the ratepayers in the January elections. The City Council agrees to give the company a site of 15 acres, with a 500-ft. frontage on the water, and to loan the company \$100,000 and give it exemption from all taxes but those on school account.

It is announced that the Pella Stacker Company, Pella, Iowa, will locate a Canadian branch of its industry at Port Arthur, Ont. The sum of \$45,000 is to be expended on land and buildings. The construction of the factory is to be begun in the spring.

The Giant Powder Company is understood to have made arrangements for the transfer of its present works at Telegraph Bay, on Vancouver Island to Nanoose Bay, a short distance from Comox. Nanoose Bay is the terminal point on the East Coast of the Island for the Canadian Pacific Railway system.

The Taylor Milling & Elevator Company is about to build in Nelson, B. C., the largest wheat elevator in that province and also a flour mill of large capacity.

The Western Dry Docks Shipbuilding Company, Port Arthur, Ont., has the contract to build a large package freight steamer for J. W. Norcross, Toronto.

The B. C. Marine Railway Company will construct at its plant in Esquimaux, B. C., a steel screw steamer for the Canadian Pacific Railway Company.

The large penstock at the Powell River Pulp & Paper Company's plant, Powell River, B. C., collapsed some days ago and has delayed the beginning of manufacturing operations there for a short time.

Webb & Gifford have erected a machine shop in New Westminster, B. C.

The Llewellyn Iron Works, of Seattle, has opened an office in Vancouver, B. C.

By-laws are to be submitted to the ratepayers of Moose Jaw to raise money for extending the fire alarm system by an outlay of \$17,000 and for enlarging the waterworks by an outlay of \$550,000.

The B. C. Hydraulic Company, Victoria, B. C., has offered to install a street railway in Manaimo, B. C., provided the council guarantees interest on the bonds issued.

The Quinlan-Carter Construction Company is moving its plant from Glenbow to Calgary, Alberta.

A building site has been purchased for the Western Canada Foundry Company in Calgary, Alberta. Works are to be erected at an estimated cost of \$250,000.

The Canada Life Insurance Company, Toronto, has purchased in Calgary a site on which it proposes to put up an office building to cost \$200,000.

Up to December 15 tenders will be received by the Mayor of Neepawa, Man., for the following: Pump

house and filter room, water tower, cast-iron water pipes, gate valves, fire hydrants, etc., mechanical filters, pumping machinery, dam, intake and reservoir, wooden stave pipes, sewer pipes, laying conduit and sewage disposal works.

The Renfrew Lumber Company is proposing to build a saw mill on Silver Creek near Hope, B. C.

The Nicola Valley Meat Company is calling for tenders for the erection and equipment at Merritt, B. C., for the cold storage plant to cost \$15,000.

The McLaughlin Carriage Company, Oshawa, is erecting in Saskatoon, Sask., a garage and warehouse to cost \$60,000.

It is announced that the Carson Creamery Company will construct a plant at Winnipeg to cost \$250,000.

Eastern Canada

TORONTO, ONT., November 13, 1911.

Manufacturers are busy and most of them have work for months ahead. Good weather has favored them, as it has enabled many outdoor activities that figure largely in the demand for plant and equipment to continue their operations. The movement of the crop keeps a large fund of money engaged, but manufacturers are not incommode on that account. The Dominion Steel Corporation has advance orders for rails that will keep its plant busy until next summer.

The City Council of Toronto proposes to submit to the ratepayers a by-law to raise \$1,500,000 more to be expended on the municipal hydroelectric system.

It is announced by the Mines Department at Ottawa that J. M. Shuttleworth, of Brantford, and associate manufacturers have contracted with the government to continue the work at Alfred, and will spend over \$500,000 in trying an improved Anrep peat machine. The machine will have a capacity of 60 to 80 tons per day, as compared with the 30 tons the government machine turned out. It will be in operation next spring, working double shifts of 20 hours for 110 days. The power for driving the machinery and for lighting the field at night will all be derived from peat, hence the plant will be self-contained.

The National Brick Mfg. Company is constructing a plant at Delson Junction, near La Prairie, Que. The cost of the buildings and machinery will be about \$500,000.

The Standard Quarries, Ltd., Montreal, has just bought from Mussels, Ltd., a new crushing plant of 1000 tons per day.

The award of the contract for building the dry dock for Vicars, Sons & Maxim at Montreal is to be announced in a few days, the tenders having been opened this week. The estimated cost of the work is \$5,000,000.

The town of Owen Sound, Ont., has under consideration a project for the building of a street railroad.

The municipal corporation of Plaisance, Que., proposes to build a steel bridge over the Nation River.

The following tenders were received by the City Council of Toronto for the construction of its projected subway: Pearson & Co., New York, \$5,000,000; Patrick McGovern, Boston, \$3,840,000; Coleman Bros., Boston, \$3,840,000; Nawn Contracting Company, Boston, \$3,628,857; E. E. Smith & Co., New York, \$3,613,000; Larkin & Sangster, St. Catharines, \$3,500,000; James Stewart & Co., New York, \$2,924,000; F. F. Cranforth, Brooklyn, \$2,856,000; H. J. Haney & Co., Toronto, \$2,600,000; five other tenders, among whom were A. M. Orpen & Co. and J. H. McKnight & Co., local firms.

The ratepayers of Three Rivers, Que., have approved the by-law to provide electric cars for the local street railroad at a cost of \$800,000.

The contract for the electrical installation required to operate the new bascule bridge at Quebec, Que., will be let in a few days.

The Norton Company, Chippewa, Ont., will double its plant in the spring. It manufactures grinding wheels.

The Mayor of Hamilton will receive during the next two months sealed proposals for bids to supply the following classes of material for the distribution plant of the city's hydroelectric system:

- A.—Substation buildings, heating, lighting, plumbing, etc., for same.
- B.—Station equipment, including transformers, switches, switchboards, lightning arresters, instruments, oil tanks and other appurtenances.
- C.—Wood poles, cross arms, pins, sideblocks, braces, insulators, machine bolts, lag screws, brackets, anchors, pole steps, guy wires, etc.
- D.—Reinforced concrete poles, condulets, conduit, steel reinforcing, cross arms and castings.
- E.—Underground conduit system construction, including cable racks, manhole and hand hole castings, structural steel, fuse pillars and castings.
- F.—Conduit ducts (tile, fibre or other system for underground distribution).

G.—Weatherproof and rubber covered copper and aluminum solid and stranded wire, lead encased cables and installation of same, distribution boxes, pot heads and connectors.

H.—Line transformers, meters, cutouts and devices, lamps, wiring supplies or other appliance, device, apparatus or material entering into the construction and equipment as above mentioned.

I.—Printing, stationery, office systems, and books of account and The Fredericton Nutlock Company, Fredericton, Ont., is applying for incorporation.

The Laidlaw Bail Tie Company, Hamilton, Ont., is preparing to erect a wire-nail factory.

The Canadian Drawn Steel Company, Hamilton, Ont., is making a large addition to its factory.

The I X L Ladder Company, Montreal, has applied to the Council of Longueuil, Que., for concessions for the erection of a factory.

The Hamilton Bridge Works Company, Hamilton, Ont., has had plans prepared for the construction of a factory to cost \$30,000.

The Gillette Safety Razor Company, of Canada, is putting up a factory in Montreal to cost \$112,000.

G. J. Foy is building an office and warehouse in Toronto to cost \$75,000.

The T. Eaton Company is erecting a factory in Toronto to cost \$35,000.

A warehouse to cost \$40,000 is being built in Toronto for the E. B. Eddy Company, Hull, Que.

It is stated that the White Chicle Company will erect a plant at Niagara Falls, Ont.

The Guelph Stove Company, Guelph, Ont., is contemplating an enlargement of its plant.

The Canadian Cannery, Ltd., is negotiating for the erection of a large factory at Forest, Ont.

The Leather Label Overall Company, Windsor, Ont., is erecting a new plant.

Canadian Motors, Ltd., has begun the erection of its factory in Galt, Ont.

Grant, Holden & Graham, Ltd., capital \$100,000, are about to start the construction of works in Ottawa for the manufacture of tents, awnings, etc.

The Canadian Northern Railway Company has arranged for the building of shops in Quebec at a cost of \$200,000.

The Edwardsburg Starch Company, Cardinal, Ont., has completed plans for the enlargement of its plant which will double its capacity. Charles Knoll is consulting engineer and superintendent.

The American Gasket Company has established a Canadian branch plant with office in the Review block at Bridgeburg, Ont., opposite Buffalo.

The Hamilton Gas Mantle Company has been incorporated at Hamilton, Ont., with a capital stock of \$40,000 and has arranged for a factory for making gas mantles. Jos. Herzog is superintendent.

The Montrose Paper Company, Thorold, Ont., is completing plans for a two-story addition to be made to its factory.

The Dominion Axle & Forge Company, Ltd., Guelph, Ont., recently chartered, has commenced construction of its factory.

Government Purchases

WASHINGTON, D. C., November 13, 1911.

The Paymaster General, Navy Department, Washington, will open bids November 28, under schedule 4069, for one 1½-in. bolt and rivet forging machine and four portable pneumatic geared hoists, and under schedule 4070 for two tool hardening furnaces.

The Bureau of Supplies and Accounts, Navy Department, Washington, will open bids December 12, under schedule 4071, for furnishing and installing electric traveling crane at Mare Island, Cal.; schedule 4073, for two oil burning portable furnaces; schedule 4072, for one electric motor truck.

The Department of the Interior, Washington, will open bids November 21 for furnishing and erecting an acetylene gas lighting plant at the Yakima Indian School, Washington.

The light house inspector, Third district, Tompkinsville, N. Y., opened bids October 30 for installing electrical apparatus in light house tender Iris, as follows:

Kelting Electric Company, New York, \$1,138.52; Charles Cory & Sons, New York, \$1,260; Joseph Barry & Co., New York, \$1,300; Griscom-Spencer Company, New York, \$2,713; Casey-Naser Electric Company, New York, \$1,345; Smith-Meeker Engineering Company, New York, \$1,454.

The light house inspector, Fifth district, Baltimore, Md., opened bids October 30 for removing old boilers and furnishing and installing new boilers and oil engine air compressing plant on light vessel No. 52 as follows:

Skinner Shipbuilding & Dry Dock Company, Baltimore, Md., \$7,900; McIntyre & Henderson, Baltimore, \$3,766; Chesapeake Marine Railway Company, Baltimore, \$9,147; Spedden Shipbuilding Company, Baltimore, \$9,999.75.

The Bureau of Supplies and Accounts, Navy Department, Washington, opened bids October 31 for material and supplies for the navy yards as follows:

Schedule 4004, class 111, for band saw sharpener, hand saw stretcher, combination automatic for hand lap grinder.—Bidder 10, Baldwin, Tuthill & Bolton, Grand Rapids, Mich., \$790.75 and \$786.40; 40, Chicago Machinery Exchange, Chicago, Ill., \$949.20; 72, J. A. Fay & Egan Company, Cincinnati, Ohio, \$765.75; 75, Frevert Machinery Company, New York, \$790.75; 91, Blanchette Swage Works, Big Rapids, Mich., \$805.05; 109, E. F. Kerwan & Co., Baltimore, Md., \$531; 111, Kemp Machinery Company, Baltimore, Md., \$970.72; 133, Manning, Maxwell & Moore, New York, \$798.50 and \$813.

Schedule 4005, Class 121, one set pneumatic flanging clamps.—Bidder 96, Hilles & Jones Company, Wilmington, Del., \$522; 142, Niles-Bement-Pond Company, New York, \$795; 169, Joseph T. Ryerson, & Son, New York, \$780; 170, Scully Steel & Iron Company, Chicago, Ill., \$456; 209, Wickes Bros., Saginaw, Mich., \$797 and \$872.

Class 122, one rapid action punch and riveter.—Bidder 57, Covington Machine Company, Covington, Va., \$1,050; 74, Ferracute Machinery Company, Bridgeton, N. J., \$1,790; 96, Hilles & Jones Company, Wilmington, Del., \$1,248; 111, Kemp Machinery Company, Baltimore, Md., \$1,030; 145, George A. Ohl & Co., Newark, N. J., \$1,975; 169, Joseph T. Ryerson & Son, New York, \$1,327; 170, Scully Steel & Iron Company, Chicago, Ill., \$1,297; 188, Toledo Machine Tool Company, Toledo, Ohio, \$1,176.25; 209, Wickes Bros., Saginaw, Mich., \$1,385.

New Tools and Appliances

This is essentially a news department for which information is invited.

Tool Holders.—Goose-neck construction characterizes a new line of tool holders that has been recently brought out by the Superior Machine Tool Company, Kokomo, Ind. These tool holders are drop-forged from steel, machined and case-hardened and are said to combine strength with resiliency on account of their special construction. Another advantage claimed for the holders is that they avoid all chatter and breaking of blades or cutters. Two types of holder are made, one for cutting-off tools and the other for threading tools. Two sizes of holders are made, one having a ½ x 1¼ in. shank, and a ¾-in. blade, while the other size has a ¾ x 1¼ in. shank and a ¾-in. blade. The cutters for the threading tools are made of high-speed steel and can be furnished for the U. S. standard or the V-threads.

Vacuum-Pot.—Simplicity, close regulation and positive prevention of leaky valves are the special features claimed by a new type of quick-acting vacuum pot invented by Fred B. Miller, 147 Fourth street, Milwaukee, Wis. In operation when the plunger is released air which has been taken in through the air valve is discharged through an adjustable check valve. When the plunger drops the piston takes the thrust without jar by reason of the air cushion and the spring on its lower side. The air valve can be adjusted to increase or diminish the amount of air taken into the cylinder to suit the spring, which is adjusted by a screw.

Gauges.—W. H. Nichols, Waltham, Mass., has recently developed several new types of external and internal gauges. One of these is a thread gauge, in which provision has been made for adjusting the ring as well as the plug within reasonable limits. These gauges are made up to several inches in diameter and the plug consists of a disk threaded upon the periphery, split at six equi-distant points and mounted on a handle which is tapered at the end to fit a hole of corresponding taper in the disk. Although a reasonable amount of adjustment of the gauge is permitted by the taper fit, provision is made to prevent careless or unintentional adjustment due to dropping on the floor or other similar causes. Among the other gauges are included short cylindrical plugs for testing holes that are being ground. The plugs are mounted on very short handles and in using them the grinding wheel is run back only a short distance, since a small amount of space is all that is required to admit the gauge to the mouth of the work. The rings of the larger sizes can be reground, if necessary, to some smaller size after they have become worn. Another gauge is of the taper plug and ring type, with the former cut to less than half the usual length. This gauge is intended for comparatively shallow holes which are made to the standard taper and do not require the regular length of gauge. For testing annular ball races and similar work an internal gauge has been made which carries a pair of spherical contact points at the short end of the lever while the jaws at the opposite end are lapped to close when the gauging points are to a certain diameter. When using this gauge the device is slipped into the work and the gauging jaws open until they are in contact with the interior of the piece. If the work is the proper size the outer jaws will just come in contact with each other.

Current Metal Prices.

The following quotations are for small lots, New York. Wholesale prices, at which large lots only can be bought, are given elsewhere in our weekly market report.

IRON AND STEEL—		Genuine Iron Sheets—		METALS—	
Bar Iron from Store—		Galvanized		Tin—	
Refined iron:		Nos. 22 and 24.....	lb 5.50¢	Straits pig.....	lb 45 @ 46
1 to 1 1/4 in. round and square.....	lb 1.70¢	No. 26.....	lb 6.00¢		
1 1/4 to 1 1/2 in. x 3/4 to 1 in.....	lb 1.80¢	No. 28.....	lb 7.00¢	Copper—	
1 1/2 to 1 3/4 in. x 3/4 to 1 in.....	lb 1.80¢			Lake ingot.....	lb 14 @ 14 1/4
1 3/4 to 2 in. x 3/4 to 1 in.....	lb 1.80¢			Electrolytic.....	lb 13 1/4 @ 14
Angles:				Casting.....	lb 13 1/4 @ 14
3 in. x 3/4 in. and larger.....	lb 1.80¢	Corrugated Roofing—		Spelter—	
3 in. x 3-16 in. and 1/2 in.....	lb 1.80¢	2 1/2 in. corrugated.....	Painted Galvd.	Western.....	lb 6 1/2 @ 7 1/4
1 1/2 to 2 1/2 in. x 3/4 in.....	lb 1.85¢	No. 24 in. corrugated.....	100 sq. ft. \$3.75 \$4.70	Zinc—	
1 1/2 to 2 1/2 in. x 3-16 in. and thicker.....	lb 1.85¢	No. 26.....	100 sq. ft. 2.85 3.90	No. 9, base, casks.....	lb 8 1/4¢ Open... lb 8 1/4
1 to 1 1/2 in. x 3-16 in.....	lb 1.95¢	No. 28.....	100 sq. ft. 2.50 3.65	Lead—	
1 to 1 1/2 in. x 1/2 in.....	lb 2.00¢	Tin Plates—		American pig.....	lb 5 @ 5 1/4
3/4 x 1/2 in.....	lb 2.10¢			Bar.....	lb 6 @ 6 1/4
3/4 in. x 1/2 in.....	lb 2.15¢	American Charcoal Plates (per box)		Soldier—	
3/4 in. x 3/4 in.....	lb 3.35¢	"A. A. A." charcoal:		1/2 & 3/4, guaranteed.....	lb 25 1/4 @ 26
1/2 x 3-32 in.....	lb 4.40¢	IC, 14 x 20.....	\$6.65	Refined.....	lb 22 1/4 @ 23
		IX, 14 x 20.....	7.90	Prices of solder indicated by private brand vary according to composition.	
Tees:		A. charcoal:		Antimony—	
1 in.....	lb 2.25¢	IC, 14 x 20.....	\$5.60	Cookson.....	lb @ 10 1/4
1 1/4 in.....	lb 2.10¢	IX, 14 x 20.....	5.70	No. 1.....	lb @ 10 1/4
1 1/2 to 2 1/2 x 1/2 in.....	lb 1.90¢	American Coke Plates—Bessemer—		Other brands.....	lb @ 9 1/4
1 1/2 to 2 1/2 x 3-16 in.....	lb 2.60¢	IC, 14 x 20.....	107 lb. \$4.50	Bismuth—	
3 in. and larger.....	lb 1.85¢	IX, 14 x 20.....	5.50	Per lb.....	\$2.00 @ \$2.25
Beams.....	lb 1.80¢	American Terne Plates—		Aluminum—	
Channels.....	lb 1.80¢	IC, 20 x 28 with an 8 lb. coating.....	\$8.70	No. 1 aluminum (guaranteed over 99% pure), in	
Bands—1 1/4 to 6 x 6-16 to No. 8.....	lb 2.00¢	IX, 20 x 28 with an 8 lb. coating.....	10.70	Ingots for remelting.....	21¢ and 22¢
Burden's "H. B. & S." iron, base price.....	lb 2.95¢	Seamless Brass Tubes—		Rods and Wire.....	Base price 31¢
"Burden's Best" iron, base price.....	lb 3.15¢	List November 13, 1908.....	Base price. 18¢	Sheets.....	Base price 33¢
Norway bars.....	lb 5.60¢	Brass Tubes, Iron Pipe Sizes—		Old Metals—	
Merchant Steel from Store—		List November 13, 1908.....	Base price. 18¢	Dealers' Purchasing Prices Paid in New York.	
Bessemer machinery.....	per lb 1.70¢	Copper Tubes—		Copper, heavy and crucible.....	
Toe cut, tire and sleigh shoe.....	lb 2.50 @ 3.00¢	List November 13, 1908.....	Base price. 21¢	Copper, heavy and wire.....	
Best cast steel, base price in small lots.....	lb 7¢	Brazed Brass Tubes—		Copper, light and bottoms.....	
Sheets from Store—		List February 1, 1911.....	18 1/4¢ @ lb	Brass, heavy.....	
Black		High Brass Rods—		Brass, light.....	
One pass, C. R. R. G. soft steel, cleaned.		List February 1, 1911.....	14 1/4¢ @ lb	Heavy machine composition.....	
No. 16.....	lb 2.35¢ 2.75¢	Roll and Sheet Brass—		Clean brass turnings.....	
Nos. 18 to 20.....	lb 2.40¢ 2.85¢	List February 1, 1911.....	14 1/4¢ @ lb	Composition turnings.....	
Nos. 22 and 24.....	lb 2.45¢ 2.95¢	Brass Wire—		Lead, heavy.....	
No. 26.....	lb 2.50¢ 3.05¢	List February 1, 1911.....	14 1/4¢ @ lb	Lead, tea.....	
No. 28.....	lb 2.85¢ 3.30¢	Copper Wire—		Zinc, scrap.....	
Russia, Planished, &c.		Base price.....	Carlond lots mill 13 1/4¢		
Genuine Russia, according to assort-		Copper Sheets—			
ment.....	lb 12 @ 14 1/4	Sheet copper hot rolled, 16 oz. (quantity			
Patent planished, W. Dewees		lots).....	lb 17¢		
Wood.....	lb A. 10¢; B. 9¢ net	Sheet copper cold rolled, 1¢ @ lb advance			
Galvanized		over hot rolled.....			
Nos. 12 and 14.....	lb 2.65¢	Sheet copper polished 20 in. wide and under,			
No. 24.....	lb 2.90¢	1¢ @ square foot.....			
No. 26.....	lb 3.20¢	Sheet copper polished over 20 in. wide, 2¢			
No. 28.....	lb 3.50¢	@ square foot.....			
No. 20 and lighter 36 inches wide, 25¢ higher.		Planished copper, 1¢ @ square foot more			
		than polished.....			

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